

# The digital divide: investigating the perspectives of students in Swaziland

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Thank you Lord!

## DECLARATION

I, Tibo Majaji Kiefer, declare that

### **The digital divide: investigating the perspectives of students in Swaziland**

is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## **ABSTRACT**

The digital divide has been a factor of technology that negatively affects the people of developing countries, such as Swaziland. While technology has advanced rise in the first world, developing countries are slowly attempting to catch up; yet, it is difficult for them due to factors such as limited technological background and poor infrastructure.

The aim of this study was to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide. The study also determined what efforts can, according to these students, be made in Swaziland to help bridge the gap of this technological epidemic. The study was conducted in the interpretive research paradigm. The researcher applied grounded theory, and integrated it with a systems approach, that is, soft systems methodology, to facilitate understanding of the problem context and demonstrate understanding of the situation.

The SSM customers, actors, transformation, worldview, owner, environment categories were applied to develop and structure interview questions. Rich, qualitative data were gathered by interviewing students from Swaziland. Gathered data were coded and categorised, and themes were developed within the soft system methodology and customers, actors, transformation, worldview, owner, environment framework. Analysed data are presented visually in the form of root definitions (RDs), a rich picture and a human activity diagram. Which reflects the results reached of students being provided poor technological infrastructure, services and skills.

The outcome of the study is specific transformation actions that, according to the students, can improve the DD situation in Swaziland. The outcome mirrors some of the causative factors, according to the literature, of DDs in developing countries such as Swaziland.

**Keywords:** The digital divide, the digital divide in developing countries, soft systems methodology, information and communication technology.

## **ABBREVIATIONS**

CATWOE – Customers, Actors, Transformation, Worldview, Owner, Environment

DD – Digital Divide

ICT – Information Communication Technology

ISP – Internet Service Provider

MTN – Mobile Telecommunications Network

NWU – North-West University

RDs – Root Definitions

SPTC – Swaziland Post and Telecommunications Corporation

SSM – Soft System Methodology

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# CHAPTER 1: INTRODUCTION AND BACKGROUND

## 1.1 Introduction

The aim of this study was to investigate the perspectives of students in Swaziland<sup>1</sup> regarding factors that are contributing towards the digital divide (DD). The study also determines what efforts can, according to these students, be made in Swaziland to help bridge this technological gap. The researcher applied a soft systems methodology (SSM), to guide and structure the study. SSM also assisted with the development of interview questions and the presentation of results, it furthermore helped with the understanding and visually illustrate required transformation. This chapter introduces and motivates the study. It defines the key concepts. It also outlines the research objectives, design and method, and gives a brief chapter overview.

## 1.2 Key concepts in this study

The following key concepts of this study are briefly discussed next: the digital divide (DD) and soft systems methodology (SSM).

### 1.2.1 The digital divide

The DD exists all across the world (Castells, 2011:325). The internet is inconsistently and unevenly developed across continents, forming what is referred to as the "global DD" (Castells, 2011:333; Norris, 2001:8). The global DD affects various countries all around the world. It does not *only* affect developing countries, but affects them the most (Chen & Wellman, 2004:16). Empirical and literature studies of the global DD show that educational levels and the average standard of living in a country are strongly influenced/predicted by the level of internet usage (Guillén & Suárez, 2005:684).

According to Ali (2011:188), the global DD outlines the unequal scattering of information and communication technology within and among different nations, which they describe as "the gap between the have-nots and haves". The DD represents a gap which describes inequalities in terms of aspects such as the internet and other information and communication technology related problems. Castells (2002:248) defines the DD as "the inequality towards the internet access," while De Beer (2007:6) refers to it as the "knowledge gap."

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<sup>1</sup> The name of the country changed from "Swaziland" to "Eswatini" recently. It happened after registration of the study and the study's title; it also happened after the student gathered all data from participants. The student therefore acknowledges that the country is now named "Eswatini"; however, he used the name "Swaziland" throughout the document for consistency and to be consistent with the registered title of the study.

The wealthy are not the ones being mostly affected by a DD. It affects the poor the most. Global inequality is an issue associated with the DD since technology is a division of material riches and wealth production (Fuchs & Horak, 2008:100). Less than ten percent of the population in developing countries uses the internet, causing the gap between developing and developed nations to continue to widen (Guillén & Suárez, 2005:681).

Africa, including Sub-Saharan Africa, contributes to only two percent of the world's internet usage; yet, it has fourteen percent of the world's population (Gebremichael & Jackson, 2006:272). Some countries within the Sub-Saharan region lose considerable a lot of information and communication technology investors as a result of issues such as government monopoly systems in telecommunications (Gebremichael & Jackson, 2006:271). This widens the DD. This is also the case in Swaziland. For example, in Swaziland only one company, Swaziland Post and Telecommunications Corporation (SPTC), is responsible for telecommunications and it does not offer a gateway for other companies to compete with it; it is currently the only internet service provider (ISP). It provides all the mobile service providers with internet capabilities to offer to their customers.

So, developing countries, such as Swaziland, are suffering the most because information and communication technology inequalities are more, compared to developed countries. For instance, very few people can afford to have an internet connection in developing countries (Fuchs & Horak, 2008:90). As a result they then lack essential information and communication technology skills. They cannot access the internet or even use a computer. Chen and Wellman (2004:20) state that developing countries lack infrastructure, resources, and skills. This prevents them from being involved in the information era, which is formed by the global network, the internet.

The DD is discussed in the context of both developing and developed countries. However, the researcher mainly focused on African developing countries, and in particular on Swaziland. The following are factors that affect the DD (Chen & Chan, 2011; Chen & Wellman, 2004; Fuchs & Horak, 2008; Hargittai, 2003; Hargittai & Hinnant, 2008; Li & Xu, 2002; Van Dijk & Van Deursen, 2009; Van Dijk, 2006). They are discussed in more detail in Chapter 2.

- Internet access: The internet is discussed in terms of the problems hindering its availability and accessibility. Furthermore, on how it contributes to the DD.
- Economy: The DD is discussed in terms of the factors that affect the economy in developing countries, and how these contribute towards the DD gap.
- Cost: It is discussed in terms of how it affects the DD. It is also discussed in terms of whether people are able to afford digital communication and how it contributes to the DD.

- Rich and poor areas: Information is gathered that enables comparison of the areas that are most affected by the DD.
- Telecommunication: Information is gathered on what factors of telecommunication are that are causing the digital divide.
- Education: Education is discussed in terms of how it is affected by the DD, that is, the impact of the DD on education.
- Culture: Cultural differences are discussed regarding how they affect the DD. Culture is one of Swaziland's pride, and it is practiced everywhere.
- Age: It is discussed how age groups are affected, and which age groups are most affected by the digital divide.
- Gender: Information is gathered to find out which gender group is mostly affected by the DD.
- Technology acceptance: Information is gathered to find out how the youth shows interest in technology, despite the DD gap.
- Information communication technology (ICT): ICT is discussed in terms of factors causing delays in ICT penetration in developing countries, and ICT access in developing countries.
- Mobile networks: Information is gathered on how mobile networks may affect the DD positively or negatively. For example, it discusses how mobile networks are forced to use Swaziland Post and Telecommunication Corporation (SPTC) as the only internet gateway.

### **1.2.2 Soft system methodology**

A systems approach is applied to guide this study. Maqsood *et al.* (2001:2) say that SSM utilises systems thinking; it can be applied to different situations to facilitate understanding of complex social phenomena; and it uses a systems approach to analyse and solve problems in messy and complicated circumstances. Vickers (2013:176) adds that SSM assists people to deal with complex situations of humankind. It aims to enable a problem solver to acquire knowledge and get a holistic understanding of multiple individual perceptions, with different mindsets, sharing a situation (Andrews, 2000:40). It can aid interpretive research, and it focuses on evaluating multiple options of many domains, including information and communication technology (Maqsood *et al.*, 2001:2).

The SSM theoretical framework was developed by Checkland (1985) at the Lancaster University; he created it to solve business management problems by applying systems engineering approaches. Khosrow-Pour *et al.* (2012:1143) stipulate that SSM is a methodology which is used to perform analysis and explore potential changes to possibly improve human activity systems. SSM is often used to learn about different perspectives of individuals involved in a situation (Andrews, 2000).

In this study, SSM is used to analyse a problem and demonstrate an understanding of the situation. This analytical tool is used to guide the investigation of perspectives of students in Swaziland, on how the DD affects them. Checkland (2000a:17) states that the purpose of SSM is not to solve the

problem, but to acquire more knowledge about the problem, so as to enable a problem solver to take actions so that the problem can be resolved. In this study, the researcher learned about the problem of the DD in Swaziland from the perspective of students involved in and affected by it.

The researcher followed an interpretive research approach. To complement it, SSM was applied to structure interviews and present the results. Data were coded and categorised, and then related to themes, as per the SSM categories, that is, CATWOE (Bergvall-Kåreborn *et al.*, 2004). SSM and its position in this study is discussed in more detail in Chapter 3.

### **1.3 Problem statement and motivation of the study**

According to Peters (2005:144) ICT is renowned for being an essential weapon of war to reduce poverty around the world; most of the first world countries are ahead with technology when compared to developing countries. He further says that countries in Africa seem to be lagging behind even more with regard to technology. The difficulties facing the world, particularly developing nations such as the Kingdom of Swaziland, are many, and have fluctuated (Magagula, 2005:305). According to Isaacs (2007:2), Swaziland is a nation that is extremely poor, and its ICT infrastructure is weak. So, a problem such as slow (or even no) internet connectivity is an everyday frustration for the country at large.

According to Pénard *et al.* (2015:77), internet connection speed in developing countries is, in general, extremely slow. Most citizens cannot afford to purchase an internet connection, or have the latest technology in terms of computers or mobile phones to browse the internet easily. Magagula (2005) stipulates that it is shocking to see that ICT is not readily accessible in many developing nations such as Swaziland; it is because of a few factors such as lack of: financial resources for internet access, quality personal computer related equipment, software and, most critically, suitable ability to maintain them.

The ICT growth in Swaziland is shockingly slow; the country also received its internet service very late compared to neighboring countries such as South Africa. The first launching of an internet service provider in the Kingdom of Swaziland was in 1995 (Wamala, 2005:6). Magagula (2005:306) says that the service provider still uses copper-wire telephone lines infrastructure, which is not reliable; also, limited bandwidth causes the internet to perform slowly. He also stipulates that there is insufficient specialised ability to oversee and maintain infrastructure and equipment. This results in fewer people being connected to the internet in the country when compared to developed countries where such matters are taken care of (Magagula, 2005:306).

Most of the government schools in Swaziland currently do not have access to the internet and lack proper technological infrastructures; so, ICT learning does not happen (Magagula, 2005:306).

Kunene (2004:157) notices that in Swaziland the absence of internet connectivity brought about numerous children completing primary school and secondary school without having seen or worked with a personal computer. This situation is discouraging for the learners that want to further their tertiary education in computer/information related courses such as computer science and information technology. Mndzebele (2013:410) states that the schools in Swaziland that have computers, have a problem when it comes to obtaining teachers qualified to teach ICT subjects.

Most of the teachers that teach ICT in Swaziland's schools, where there are computers available, have not even been subjected to any form of computer/information related institutional training; this includes basic skills such as using computers or the internet (Magagula, 2005:306). They also do not have a teachers training centre to train teachers to become ready to teach ICT in schools (Mndzebele, 2013:410). If educators are not well qualified to teach a subject, learners or students will not attain the necessary skills and benefit from the learning offered by that educator. Mazibuko and Harber (2013:221) say that the Swaziland schools that have learners taking part in the ICT General Certificate of Secondary Education (GCSE) examination perform exceptionally badly when compared to the learners from other countries that also wrote the same examination.

According to Sutherland (2012:3) tackling the DD problem has never been so difficult—government policy is often hindering ICT advancement. The ICT government policy in Swaziland is one of the leading causes for the lack of technological infrastructures. Sutherland (2014:375) observes that where government systems are weak, they are likely to deliver poor results, for instance, resulting in improper strategies and policies. Also, certain governments do not seem to be interested in policies to advance policing regulation of ICT (Sutherland, 2014:375). This is dangerous and often leads to corruption, nepotism, and bribery; resulting in monopolist telecommunications companies that are often also corrupt in such a way that bribery and corruption are a factor in government policy formulation, thus causing problems for the licensing of other operators (Sutherland, 2012:3).

Swaziland's telecommunications are state owned in an old fashioned way; it causing barriers to entry for any competition from other and international telecommunications suppliers, which leads to monopolistic government policies towards the international gateway (Sutherland, 2012:19; Sutherland, 2014:375). Chinn and Fairlie (2006:1) add that the DD is giving policy makers a serious challenge. Sutherland (2014:378) stipulates that without significant answers from a single sector, of examination into the Swazi economy, it will appear that the monarch is obtaining great recourses for itself in the telecommunications business and whoever opposes it can/will quickly be let go of. This is resulting in lack of opportunities for others seeking to compete in this market.

The SPTC, up until now, does not have an opposition, or simply does not have any competition in the Kingdom of Swaziland (Sutherland, 2014:379). It is the sole authority that may provide any communications medium in the country; it is authorized by means of an updated regulatory act, that is, the *Authorisation Commission Act of 2013* (Sutherland, 2014:379). So, pricing can be manipulated at any moment when the company feels that they need more revenue to be coming in, without worrying about competitors.

These are just a few examples of the causes of the DD, the consequent lack of ICT, and the negative effects thereof on the people of Swaziland. This study is motivated by the lack of ICT in Swaziland and, consequently, the DD that negatively impacts upon Swaziland's students. These students represent the younger generation and future leaders of Swaziland. The researcher, therefore, investigated the perspectives of Swaziland's students towards the DD. He confirmed whether the literature reflected the perspectives of the students. The objectives of the study are outlined below.

#### **1.4 Objectives of the study**

This section gives an overview of the primary and secondary objectives of the study.

##### **1.4.1 Primary objective**

The study's primary objective was to investigate the DD from the perspectives of students in Swaziland. The researcher, therefore, aimed to understand how the DD affects them, and what they think can be done to improve the DD in Swaziland.

##### **1.4.2 Secondary objectives**

Secondary objectives include theoretical and empirical objectives that assist to achieve the primary objective of a study. They are discussed next.

###### **1.4.2.1 Theoretical objectives**

Theoretical objectives are created to assist in achieving the primary objective of a study by demonstrating knowledge of the key concepts and methods applied in the study, and creating a shared understanding. So, literature reviews were done in order to gain, and demonstrate, an understanding of the study's key concepts and methods. This included reviews of the following:

- Factors that cause the DD.
- The effects of the DD.
- The position of SSM in this study; and an overview of the application of SSM.
- An overview of research paradigms, so as to motivate the choice of the interpretive research paradigm for this study.

### **1.4.2.2 Empirical objectives**

The empirical part of this research study was done in the interpretive research paradigm. The empirical objective was to investigate the perspectives of students at the University of Swaziland regarding the DD in Swaziland. For that reason, students were interviewed in terms of aspects such as their technological background and the problems they experience regarding, for example, access to the internet, computers, mobile phones, and available mobile service providers. SSM was used to structure the interviews. SSM, and its position in the study, is discussed in Chapter 3. Gathered data were analysed and interpreted according to principles of interpretive data analysis (grounded theory); presentation of analysed data were structured according to SSM. The research plan is discussed in Chapter 4; the empirical study is discussed in Chapters 5 and 6.

### **1.4.2.3 Contribution of this study**

This study contributes to the literature on the topic of understanding the DD in Swaziland. For example, searches about perspectives that younger generations (e.g. students) in Swaziland have of the DD presented limited results; it presents a gap, and thus motivated the study to be done. It also increases the level awareness of the DD's existence in developing countries, specifically Swaziland. This study is relevant to computer science because the digital divide is a factor of limitation for students to learn computer science in colleges around Swaziland and other developing countries. Furthermore SSM is used a scientific theoretical framework to guide the study in the data analysis.

## **1.5 Research design and method**

This section outlines the research design and method of the study. It includes references to literature reviews; a motivation for the chosen research paradigm; participants; the data collection and analysis method; and principles for rigor and evaluation of the study.

### **1.5.1 Literature review**

Important key words of the study were used as a searching direction for information on this topic, and literature was obtained from the North-West University (NWU) library. This means that books were utilised. Journals were also used through the University library system, such as EBSCOhost, SA ePublishers, Web of Science and Google Scholar. If no specified journals were obtained, or additional information was needed, websites were utilised.

### **1.5.2 The research paradigm: Interpretive research**

This study was conducted within the interpretive research paradigm. The following hermeneutic characteristics are relevant for interpretive research (Sensuse & Ramadhan, 2012:20):

- Rather seek to understand than to explain;
- Give recognition to the situated area of interpretation;
- acknowledge the role of historical authenticity and language in interpretation;
- see a request as a conversation; and
- find comfort in ambiguity.

Interpretive studies seek to understand phenomena from the perspectives of different people that attempt to give meaning to it (Boland Jr, 1986:250). Walsham (1993:4-5) states that interpretive research aims to bring out an understanding of an information systems context, as well as the procedure by which the context is influenced, and also in turn influences the information systems. Boland Jr (1986:348) adds that hermeneutics and phenomenology make up the interpretive research philosophical base. Hermeneutics can be underlying both a philosophical and a specific method of examination or analysis (Bleicher & Bleicher, 1980).

Phenomenology broadly refers to reflections on the experiences that people have, from their perspectives. Interpretive research assists in the understanding of how human beings think and brings on a deep insight on how individuals view information systems (Klein & Myers, 1999). Kaplan and Maxwell (2005:33) stipulate that interpretive research focuses on making sense of human situations without predefining independent and independent variables. Klein and Myers (2001:219) state that the cornerstone assumption of interpretivism is that the vast majority of knowledge that the researcher obtains is from social constructions, which can be documents, language, artefacts, tools, etc. According to Klein and Myers (2001:219) interpretive research is qualitative. It is portrayed through its aims, which identify with understanding certain parts of social life, and techniques that produce (clusters of) words, as opposed to numbers, as data to be examined (Bricki & Green, 2007).

The aim of this study was to explore and understand perspectives of a specific group of people (i.e. students) situated in a particular geographic location (that is, Swaziland). Their location, which is a developing African country, influences the existence and severity of the DD, and, therefore, the impact thereof on them. Qualitative data were gathered via interviews to understand the students' perspectives. The interpretive paradigm was thus most suitable for this study.

### **1.5.3 Participants and participant selection**

Participants of the study were students of the University of Swaziland. One campus was used, that is, the main campus in the capital city Mbabane. First and final year students were interviewed, these two academic years' students were included to determine whether there are significant differences in their technological backgrounds (since, for example, final year students have been

exposed to facilities on campus for longer than the first years). Participants from both genders were included.

#### **1.5.4 The data collection method**

According to Seidman (2013:9) interviewing is not only about getting valid answers or questioning whether a hypothesis is correct or wrong, but interviewing is also about the desire to understand what the interviewee is experiencing towards the subject you are interviewing him/her on. The SSM categories (refer to Chapter 3) guided the structuring of interview questions. Before an interview commenced, the process was explained to the participants; questions/concerns that they had were clarified. Participation was voluntary. McMillan and Schumacher (2014:360) explain that digital/tape recording of interviews ensures that verbal interaction is completed, and reliability of material can be confirmed. Hence, responses were recorded on paper and interviews were also recorded; it was done with the consent of the interviewees.

#### **1.5.5 Data analysis methods**

Data analysis in this study was done using an interpretive approach. Interpretive research studies aim to develop a theory, and, unlike positivistic research, does not begin with a hypothesis to be proved (Taylor & Goede, 2012:1967). According to Durant-Law (2006:21) SSM and interpretive analysis methods such as grounded theory are complementary and compatible- for example, these two methodologies can share techniques and tools, which means that either of the methodologies can be used for interviews or questionnaires. He continues to say that data derived via grounded theory can also be reflected on through the use of rich pictures. Furthermore, grounded theory and SSM can be utilised to extract themes and/or formulate conceptual models. McMillan and Schumacher (2014:346) state that grounded theory aids in generating or discovering a theory, which explains and gives clarity of central phenomena extracted from data collected. Coding is used to analyse qualitative data and codes are then categorised. Relationships between categories are identified and emerge as themes (Thomas, 2006:244). So, a combination of an interpretive data analysis approach and SSM was used to analyse and interpret gathered data in this study. The generation of themes was guided by SSM, and derived codes were categorised according to these.

#### **1.5.6 Rigor and evaluation of the method**

According to Klein and Myers (1999:72), an interpretive study cannot be evaluated on the same basis for rigor, as, for example, a positivistic study; so, they suggest a number principles whereby to evaluate an interpretive study. These are discussed next in the context of the study; more detail is provided in Chapter 4. Rigor is evaluated for this study in Chapter 7. The headings below are applied as they are stated by (Klein & Myers, 1999:72).

### **1.5.6.1 The fundamental principle of the hermeneutic circle**

Understanding is achieved when the researcher iterates between the interdependent parts and the whole. So, the more participants are interviewed about a situation, the better can the researcher's holistic understanding of the situation be. Thus, by interviewing many students, the researcher should gain a clear picture of how they perceive the DD to affect them. In this study, the researcher must thus continue to interview students until data saturation are achieved, i.e. until no new codes emerge from data. Also, related findings derived must be analysed and kept together. If responses are not related to one another, they must be individually examined in order to correctly understand the situation from a single participant's point of view.

### **1.5.6.2 The principle of contextualisation**

The social and historical setting of the research context must be respected. So, data must be understood in the context of where/why it is gathered, and from whom. In this study, findings must be understood, for example, in the context of how/why the DD came into existence in Swaziland, and how/why it affects the participants. The data gathered must also be understood in the context of the students' cultural background.

### **1.5.6.3 The principle of interaction between the researchers and subjects**

It requires critical reflection on the social construction of data (research materials) via the researcher and participants' interactions. During interviews, an understanding must be established concerning the DD through *findings*, rather than judging the situation through *assumptions*. In this study, the researcher must, as a citizen of Swaziland, be cautious and ensure that his empirical work is not guided by his own views on the matter, but only by the perspectives of the participants.

### **1.5.6.4 The principle of abstraction and generalisation**

The holistic picture, in the context of the research setting, must be carefully applied to develop only relevant abstract and general findings. The subject of the matter must be fairly judged and the researcher should refrain from false bias inputs, but only reflect what emerges from the data.

### **1.5.6.5 The principle of dialogical reasoning**

The researcher must be sensitive to possible contradictions between underlying theories, as per the research design, and actual findings from the data. For example, the theoretical and actual findings may not be the same as was initially thought to be the effects of the DD on Swaziland's students. Also, variations in responses may occur due to a variety of perceptions; it is the researcher's responsibility to interpret data appropriately.

### **1.5.6.6 The principle of multiple interpretations**

The researcher must be sensitive towards possible different perceptions of different participants. For example, every participant may have a different perception about his/her experience with, or towards, the DD. Even if answers are similar, some may be more sensitive to the situation than others; as an example, some people may have accepted that they do not (and never will) have access to the internet, while others may not have accepted that as a given.

### **1.5.6.7 The principle of suspicion**

The researcher must be sensitive that some participants may be biased towards the research subject. So, some findings from participants may be invalid and these may distort findings if included. Comparisons of findings will reveal this. However, a 'different' response should not be discarded, but rather highlighted as an outlier and investigated further, possibly in a follow-up study. All responses must thus be treated as valid.

### **1.5.7 Limitations to the study**

The study did not have a broader focus on all the students on the campus. Only first and final year students were interviewed. All faculties and schools were included. Not all three campuses were included. Only the Mbabane (main) campus was used to draw findings for the study.

## **1.6 Ethical considerations**

Permission was obtained from the university's management to interview students. Participation was voluntary. Participants were assured that their privacy status would be respected and kept confidential. So, for instance, names were not taken. They were treated with the utmost respect. If students felt they were no longer interested in continuing, no measures were taken to prevent them. The NWU ethical process, as prescribed, was followed.

## **1.7 Chapter classification**

This section gives an outline of the dissertation and chapter classification.

### **Chapter 1: Introduction and background**

This chapter introduces the study and its key concepts. It motivates the study. It also briefly outlines the research objectives, and research design and method.

### **Chapter 2: The digital divide**

This chapter discusses factors causing the DD and the effects of DD. It gives an overview of DD literature.

### **Chapter 3: Soft systems methodology**

This chapter discusses SSM and positions it in the study.

### **Chapter 4: The research plan**

This chapter discusses the research plan. Research paradigms and methodologies are discussed broadly and the chosen paradigm is motivated. Interpretive research is discussed in detail as it is used in this study. This chapter also outlines the research plan.

### **Chapter 5: Empirical study: Data collection and analysis**

This chapter discusses the data analysis approach that was followed in this study. The application of the eight steps of a qualitative content analysis process is discussed. Outcomes are also presented according to the SSM CATWOE categories as themes.

### **Chapter 6: Empirical study: Report on the findings**

This chapter discusses the outcome of the empirical work. Results are presented using SSM techniques; root definitions are formulated and a rich pictures drawn to illustrate the participants' perspectives regarding the DD in Swaziland.

### **Chapter 7: Conclusion**

This chapter concludes the study; it states areas of future research and discusses rigor of the study.

## **1.8 Summary**

This chapter gives a general overview of the study. It motives why it was important for this study to be done. The DD is a problem that affects most of the developing nations. It is a technological disease that hinders people from being involved in the digital information age. SSM assists to understand complicated problems; in this case it aids understanding of Swaziland's students' perspectives regarding the DD. SSM does not solve the problem, but by using SSM tools to structure the data gathered/analysed, it broadens the understanding of the perceived effect of the DD in Swaziland on students, and gives an understanding into causes of this problem.

## **CHAPTER 2: THE DIGITAL DIVIDE**

### **2.1 Introduction**

The aim of this study is to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also determines how they feel it affects them and what efforts can, according to these students, be made in Swaziland to help bridge the gap of this technological epidemic. It is an epidemic because it is affecting a large number of individuals both in Swaziland and developing countries. The DD is especially pertinent in developing African countries such as Swaziland. Ngwainmbi (2000:539) argues that most African developing countries' policy makers concentrate on eradicating poverty, rather than focus on advancing technological infrastructure. So, most African countries find it very hard to implement and use ICT, hence the existence of the DD. The purpose of this chapter is to review current literature on the DD. This includes a motivation that the DD exists; a definition of the DD; and discussions on factors that are contributing towards the DD. This chapter is imperative because it offers a general understanding of the DD problem.

### **2.2 The existence of the digital divide**

Henry (2004:4) mentions that some people argue about the existence of the DD and proclaim it to be a myth. Jones and Czerniewicz (2010:317) add to this argument by stipulating that an observed existence of computers and the internet at a particular area makes people doubt the existence of the DD. On the other hand, Gebremichael and Jackson (2006:269) claim that there is not a single country that overcame the DD and fully eliminated its existence. So, even developed countries, such as in Europe, still have a DD, but it is better managed when compared to, for example, African countries and developing nations worldwide (Gebremichael & Jackson, 2006:270). The digital divide existence (Henry, 2004) in Table 2-1; argues both for and against the existence of the DD.

**Table 2-1: The digital divide existence (Henry, 2004)**

Arguments for the DD existence	Arguments against the DD existence
<ul style="list-style-type: none"> <li>• Only the rich have means to access technology, particularly advanced and the latest technology.</li> <li>• The poor do not have means to purchase technology due to steep costs.</li> <li>• Due to lack of skills, the poor are restricted and have limited access to use a computer and access the internet.</li> <li>• School children in poor nations cannot benefit from access to the internet at school because there is none.</li> <li>• The DD is viewed as a contemplation of the world's economic divide.</li> <li>• In developing countries, a large number of people are experiencing hardships due to lack of access to technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Due to the rapidly lowering of prices of computers, they are cheap to buy, meaning that low income families can access them.</li> <li>• The complexity of computer use has lowered, and less skill is required to operate them.</li> <li>• In developing countries, internet access is readily available in all internet cafés and schools.</li> <li>• Until education and health issues are met, ICT access lacks usefulness.</li> </ul>

Table 2-1 has two categories. In the first category are the arguments of (Henry, 2004) relating to the existence of the DD. The existence of the DD is fuelled firstly by affordability. Which means that the rich can acquire the latest technologies while the poor access out of date technologies, or no technology at all. Furthermore, the rich can afford to obtain proper internet skills due to access, while the poor cannot gain any due to lack of access. Having schools that can afford the internet also gives the rich an internet use privilege, while most (relatively poor) government schools do not have or offer access to the internet. So, the poor remain lacking with regard to technology and internet skills. All of this is detrimental for the economy; if the majority of a nation's economically active citizens are lacking basic technological skills, then economic growth will also continue to deteriorate.

The second category contains the arguments of (Henry, 2004) against the DD's existence. It says that prices of computers have fallen, when compared to prices in the past. Computers have been used (and could be afforded) only by big corporations in the past; that is before they were also personalised. So, it is a sad reality that personal (supposedly readily available) computers are now believed to be affordable (by *all*, rather than only those that can afford them). It furthermore posits that complexity of ICT has also diminished. However, for the person that never had access to ICT, the level of complexity remains quite high. The internet is freely available in developed countries; this is to their advantage. However, in developing countries, it is highly unlikely that the internet is freely available to all. Lastly, education and health are still the main priorities when it comes to social issues especially in developing countries. So, the DD is ignored as a social issue by these countries, and not a priority to be resolved.

According to Gebremichael and Jackson (2006:268), developing countries are being limited by their lack of proper government regulations; this is affecting technological infrastructures in Sub-Saharan African countries. Many are not aware of the DD's existence. As an example, two friends both have mobile phones. One friend has a mobile phone that can connect to the internet. The other's phone can only receive basic calls/messages and cannot connect to the World Wide Web. The friend without the capability to access the internet is digitally divided. It may not be by own choice that he/she is in this situation. Still, he/she is affected.

Grabill (2003:459) says that education and income can be vital contributors when it comes to access to technological infrastructure. However, Brooks *et al.* (2006:270) say that low income nations are affected by the DD more because they cannot afford proper ICT infrastructure and hence do not have access thereto. According to Schweikart (2002:44), the DD is more of an economic issue in most nations, than a racial one. Racial DD will not be included in this study as it is regarded as too sensitive a topic to discuss here.

## **2.3 The digital divide**

This section defines the DD. It discusses the factors that contribute towards it and its effects.

### **2.3.1 Definition of the digital divide**

The term “technology”, as used in this thesis, includes all computer-related as well as information, digital, internet and communication-related technologies. When using the term developing country, it means a less developed nation that has low standards of living and also has a low Human Development Index (HDI) when compared to a developed country (Antonio & Tuffley, 2014:675). One of the elements that the HDI measures is the income per capita; low income is causing low living standards and ICT affordability becomes a problem.

Norris (2001:1-29) is one of a few DD researchers that developed a DD tiered model. He defines them as follows: The first of the tiers discusses the DD as an inconsistency towards electronic information access. The second one refers to the information haves and have nots in developing nations. The third tier refers to democratic DD, which means the divide is caused by individuals that are not being able to access ICT related technology in public venues such as internet cafés. Research done on the DD highlights gender, age, economics, and education as vital factors that are contributing towards differentials in internet connectivity and access (Kennedy *et al.*, 2003:73). This has led to information poverty in developed countries. In this study the DD is defined as the divide that causes people to have limited to no access to basic information and ICT infrastructure.

### **2.3.2 Factors contributing to the digital divide**

A few decades ago internet inequalities gave rise to “*the concern that technology infrastructures that are new might worsen inequality rather than better it*”, which directed the focus of analysts towards the DD as it relates to offline versus online technological devices (Kularski & Moller, 2012:359). Henry (2004:6) describes the DD as a gap that isolates individuals in terms of those that cannot obtain the internet and computers, from those that can. The DD is always known to be the gap between those that have access to resources of ICT, and those that do not (DiMaggio *et al.*, 2004). Norris (2001:56) says that the DD is an imbalance in online versus non-online communities; it involves developed versus developing countries, the rich versus the poor, and in some cases even men versus women. Norris (2001:59) continues to say that the DD is a divide which is democratic only for individuals who choose to use digital resources, or not, and are able to participate and engage publicly in terms of mobilisation and technology. Gonçalves *et al.* (2018:276) states that ICT in the past ten years has characterised its self with growth, but the DD stands unrooted, and seemingly forever widening in developing countries.

In the next sub-sections of this chapter the main factors that contribute to the DD, and their effects, are discussed. These are internet access, economy, education, ICT, culture, age, gender, cost, rich and poor areas, technology acceptance, and mobile technology and telecommunications (Chen & Chan, 2011; Chen & Wellman, 2004; Fuchs & Horak, 2008; Hargittai, 2003; Hargittai & Hinnant, 2008; Li & Xu, 2002; Van Dijk & Van Deursen, 2009; Van Dijk, 2006).

#### **2.3.2.1 Internet access**

According to Grubestic (2006:428), the internet is defined as computers that are linked together by means of an information system. Howard and Mazaheri (2009:1159) say that, due to the continuing increase of information on the internet and individuals depending on the information, the skill to utilise the internet is now regarded as a vital skill. Van Deursen and Van Dijk (2011:894) observe that the divide due to lack of physical access to the internet is less than the divide caused by absence of skills to use the internet. Van Dijk (2005:10) continues to say that the physical access gap of the internet is only closing in developed countries and not developing countries.

Hargittai and Shafer (2006:433) found that strong internet skills are acquired through years of practice. Hargittai (2002:93) also adds that, when it comes to both internet and computer use, previous experience acquired accumulates with current experience; this leads to one becoming an expert. Schumacher and Morahan-Martin (2001:72) argue that education that contributes to digital skills (for example, computer and internet use) is failing to keep up with the advancements and production of technology; it may be (partially) due to the uneven wages and salaries of people in

developed versus developing countries. Still, Van Deursen and Van Dijk (2011:897) say that, through social networks, people *can* acquire internet skills and, in that way, learn how the internet works. Education, as a factor of the DD is discussed in more detail later in this chapter.

Hafkin and Huyer (2007:36) say that internet access inequality in developing nations denies the underprivileged access to vital resources. However, (Hargittai, 2003:826); Ono and Zavodny (2007:1136) stipulate that access to the internet does not necessarily mean that it is being used. DiMaggio *et al.* (2004:44) say that there should be a distinction between opportunities given that are not used, and those that choose to use given opportunities. Still, according to Van Dijk (2006:224) factors such as (freely) available locations to use the internet and participation in courses to learn to use the internet aid to close the gap of the DD. People that are employed and students that study at higher institutions are more exposed to available internet and computers when compared to unemployed and retired people; this is especially true in developing countries (Van Deursen & Van Dijk, 2011:898). In developed countries, it happens that some people are forced into using the internet, yet they lack interest; their refusal causes a DD for them because they do not learn basic internet skills (Davis, 2003:42). This is referred to as democratic DD.

Still, developed countries are reducing the DD by offering people internet courses; this is done within organisations and also by educational institutions; it improves their internet skills (Van Deursen & Van Dijk, 2011:898). Gender, education and age are the main differentiating factors with regard to internet usage in developed countries; residence and income appear to be less relevant factors in developed nations (Van Deursen & Van Dijk, 2014:507). Van Deursen and Van Dijk (2014:522) notice that, in developed countries, the internet may create division between individuals in the same demographic areas-those with higher socio-economic status have access to internet and information while those with lower status do not.

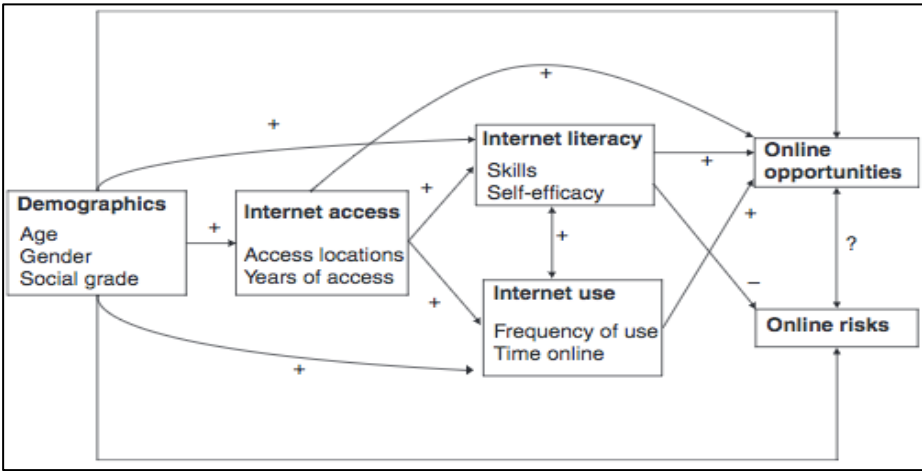
Ragnedda and Muschert (2013:133) argue that internet content that is produced locally can provide information that is unique and relevant to a local community; it may be more relevant and benefit local people in, for example, African developing countries. Such content can then be stored by and retrieved from local hosts; it will limit the amount of required bandwidth necessary to retrieve content, versus internationally hosted content (Roycroft & Anantho, 2003:64). Again, lack of such content/infrastructure in developing countries restricts use (and usefulness) of the internet (Roycroft & Anantho, 2003:64). Lack of basic telecommunications infrastructure bars populations from accessing the internet, even in developed nations (Roycroft & Anantho, 2003:64).

Roycroft and Anantho (2003:64) state that most of the telecommunication infrastructure is found in capital cities of developing African countries; however, it is not available in rural areas. Which

host up to 70% of these nations’ populations. Roycroft and Anantho (2003:66) also say that internet connection access in African developing countries remain a luxury. They provide detailed information about infrastructure in developing African countries, and argue that government policies, pricing, education, literacy and income affect infrastructure development and hence internet access negatively. Afullo (2000:210) further states that most internet hosts are located in developed countries, rather than in Africa. ICT as a contributing factor is discussed in detail later in this chapter.

Afullo (2000:212) emphasises that the issues of internet use that require attention are pricing, content licensing charges, and internet access monopoly control. Roycroft and Anantho (2003:67) note that international bandwidth hosts are available in African developing countries, but are not being accessed by local people due to high costs, limited skills such as web creation skills, and limited internet access. Jensen (2000:217) also observes that most internet content is located (and hosted) in developed countries. According to Roycroft and Anantho (2003:71), African developing countries could increase internet adoption if their native languages can be enforced as a choice. According to Antonio and Tuffley (2014:678) about 90% of the internet content is available in English, but only a third of the world’s population can speak and understand it, and this acts a barrier for those who do not understand English.

Below, Figure 2-1 shows a hypothesised model path by Roycroft and Anantho (2003:69)—it demonstrates the relationships between the variables included in the model, which influence internet access and usage.



**Figure 2-1: Hypothesised model path (Roycroft & Anantho, 2003)**

Livingstone and Helsper (2010:314) explain the model in **Figure 2-1** as follows:

- The positive and negative indicators show a relationship between the variables (demographics, internet access, internet literacy, internet use, online opportunities, and online risks).
- The demographic variables measure the usage of and access to the internet.
- Internet access leads to internet literacy and internet use.
- Internet literacy and internet use both influence each other.
- Online risk and opportunity are usually experienced by the younger generation; they are the ones that mostly use the internet.

Livingstone and Helsper (2010:314) furthermore explain this through an example: children who are slightly older have a chance to have good online skills, but teenagers who are much older that have a better chance to have better internet access have better skills; this results in internet literacy which is higher compared to that of the younger children.

### **2.3.2.2 Economy**

The economy is defined as a nation's state as it relates to consumption and production of services and goods; the aim is to produce money (Livingstone & Helsper, 2010:314). Stemler (2016:10) defines the economy in ICT terms by saying it is the growth increase per capita over a substantially long period, fuelled by the expansion of technological changes and other affecting factors. Choromides (2016:102) says that technology adoption is a vital part to ensure (positive) economic growth. The DD affects the economy; it relates directly to inequality found between different businesses, households and socio-economic statuses (Erumban & De Jong, 2006:303). Economics plays a vital role in encouraging technological infrastructure to be used in developed countries in order to boost the economy (Pick & Sarkar, 2016:3888). Unfortunately, a global information economy in developing countries is currently just a dream (Roycroft & Anantho, 2003:65). Only developed countries, such as the United States of America, have really efficient and effective internet connectivity and telecommunication systems (Gebremichael & Jackson, 2006:268).

Gebremichael and Jackson (2006:268) assume that, when more people become internet users in developing African countries, it will improve the growth of their respective economies. But, Roycroft and Anantho (2003:72) argue that there is a high possibility that the gap of the DD between developed and developing countries will forever be widening; it will continue to widen as long as social and economic development between the two societies continue to be unequal. Mariscal (2005:414) also argues that ICT cannot grow the economy as others proclaim; he says it is already "oversold". Wade (2002:444) concurs that there is a fair relationship between economic growth and ICT; it is important to note that the DD affects economic and social issues. Yet, nations with economic resources that are limited have very little ICT access, which makes it even more difficult to close the DD gap (Chadwick *et al.*, 2013:380).

According to Mariscal (2005:414), ICT can solve various economic problems; people must just learn how to use available information and resources to better themselves, especially in developing countries. The ability to access information has the potential to shrink the DD. People are already using the internet and computers to improve their economic statuses in different nations. And yet, Grabill (2003:460) argues that technology adoption is also to be considered a risk for any nation. He supports this by stating that any investment, even in technology, will have uncertainty and risk associated with it. This must be managed optimally to ensure that benefits are reaped.

### **2.3.2.3 Education**

Education is defined by Hofstede (1984:6) as the knowledge wealth obtained by an individual after a period of studying a specific subject matter. According to Winnick and Porretta (2016:24), there appears to be a link between access to computers and level of education. Schweikart (2002:45) stipulates that education offers the potential of global evenness when it comes to the use of ICT. Most higher education institutions in developed, and also in some developing countries, provide access to computers and the internet, and students spend more and more time on the internet; this is to their benefit (Van Deursen & Van Dijk, 2011:897). Mariscal (2005:414) stipulates that investing in education through ICT can immensely benefit developing nations. It can also help those that are culturally oppressed in their own countries.

Van Deursen and Van Dijk (2014:507) state that in the first 30 years after the internet's conception, it was dominated completely by people that have medium to high levels of education; they accessed it mainly at schools and at work. Limited access to technology at school level makes it difficult for students entering University; they already start with a disadvantage in this regard. People that are better educated and hold higher qualifications can adapt better to technology advancements, when compared to people that are not as educated; educated people easily acquire the digital skills necessary to use a computer and the internet (Buente & Robbin, 2008:2). Yet, Goldin and Katz (2009:7) find that individuals with low educational levels spend more time on the internet in their spare time, when compared to individuals with higher levels of educational. The question is what aspect of the internet do they explore, that is, do they use it for educational purposes or purely for entertainment. Van Deursen and Van Dijk (2014:508) find that in developed countries individuals who have low income and low educational levels tend to watch a lot of television rather than read newspapers and books through the internet.

### **2.3.2.4 Information communication technology**

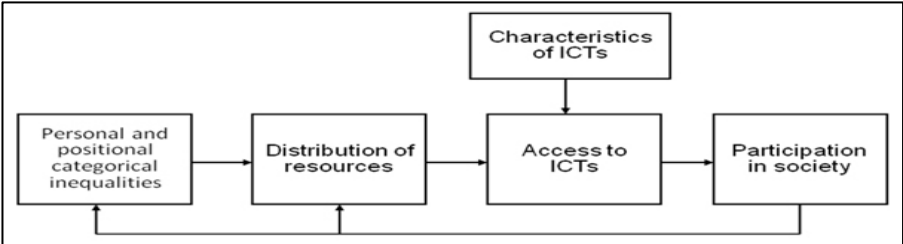
Pande (2012:1430) is of the view that the impact of ICT can help the poor to reduce poverty in developing countries-ICT offers the internet and with it, a lot of knowledge and information can

be shared through virtual classrooms and will assist all those that are willing to use it. Mariscal (2005:414) concurs that ICT is a very powerful tool; it improves a nation through increased economic growth and job creation; it can also encourage competition, and so improve local businesses and productivity. The majority of the developing world is making the most of ICT to improve peoples' standards of living; yet, it seems to have very little impact in developing African countries (Ali, 2011:233). Nafukho *et al.* (2005:117) argue that this situation is creating a DD between Africa and the rest of the (developing *and* developed) world.

According to Nafukho *et al.* (2005:117), ICT is not an irreversible tool when applied in a society. Antonio and Tuffley (2014:676) say that the majority of problems experienced in terms of the implementation of ICT infrastructure in African developing countries involves obstacles such as high internet costs, broken-down (old) telecommunication infrastructure, and limited electricity availability. Ngwainmbi (2000:535) notes that in Sub-Saharan Africa about fourteen million people share the same telephone line; it is much worse than when compared to developed cities such as Tokyo.

Joseph (2002:3) re-iterates that poverty remains one of the major obstacles to proper ICT adoption in African developing countries. Udo and Edoho (2000:330) agree that the DD basically implies access to ICT by the haves, and lack of access by the have-nots; however, DD issues have also evolved over the years into a complex phenomenon which today is to be understood in multiple ways. For example, Norris (2001:67) asserts that internet cost in low-income countries remains very high when compared to internet cost in high-income countries. And, according to Ali (2011:234), developing nations are captivated by a situation of low per-capita income, which results in lower levels of ICT penetration, which in turn causes low ICT growth and also slows economic growth.

Jamwal and Padha (2009:8) say that ICT has the following characteristics: personal and positional categorical inequalities; distribution of resources; access to ICTs; and participation in societies. Accordingly, Van Dijk (2005:15) formulated an access model; it is depicted in Figure 2-2.



**Figure 2-2: Successive kinds of access model (Van Dijk, 2005:15)**

According to Van Dijk (2005:15), the model shows the continuing cycle that results from unequal distribution to access and related resources. Lupač and Sladek (2008) stipulate that, as ICT begins to become increasingly important in today's social world (for example, in terms of culture, education, etc.), it also results in categorical inequalities; this is due to unequal access and resources distribution. As societies become more and more information aware, access to ICT becomes increasingly important; yet, access remains unequal (Van Dijk, 2005:15). Lupač and Sladek (2008) conclude that Van Dijk's model confirms that people/nations that are digitally divided, will probably remain disadvantaged.

Lupač and Sladek (2008) further note that proper use of ICT potentially reduces poverty and enhances economic growth. For example, the following ICT opportunities can positively impact developing countries (Jamwal & Padha, 2009):

- Social equality: ICT can eliminate disadvantages caused by cultural barriers. For example, ICT can be applied to improve education inequality related to gender.
- Economic equality: higher levels of education are correlated with higher income levels; this may lessen the DD.
- Innovations and economic growth: technological progress and innovation are linked to continuous and long term economic growth.
- Social mobility: individual upward movement in education, occupation, and wealth. ICT aids to improve a person's education, health, job-training and life in general.
- E-democracy: the power of ICT promotes the facilitation and transparency of communication and information among stakeholders. It can enable geographically dispersed policy makers and organizations to make decisions quickly and easily through electronic channels.

### **2.3.2.5 Culture**

Culture defines the approach whereby a specific group of people finds solutions to problems and resolve differences among themselves (Fong, 2009:472). Culture is characterised by shared values and mutually strengthening behavioural patterns (Trompenaars & Hampden-Turner, 2011:21). Also, Hofstede (2003:6) argues that different individuals have different practices, values, attitudes and norms with regard to technology and the internet; these are influenced by their social surroundings. Erumban and De Jong (2006:304) agree that culture has a powerful influential effect on individuals; it affects the way that people view technology; as a consequence, advantages may even be disregarded due to cultural preconceptions. Erumban and De Jong (2006:305) say that certain governments of African developing countries believe that the internet is a threat to their culture and national security; so, these governments limit public (or all) access to the internet. The

many and diverse cultures in Sub-Saharan African developing countries make it a technological nightmare to agree on a single uniform adoption approach across the continent.

Weingarten (2013) mentions that culture is an important factor that impacts economic activity and consequently also the DD. He also adds that the relationship between the culture at a specific time and place, versus technology, influences the extent of the DD at that time. For example, there are Africans that are influenced by modernisation and choose to rather adopt the western culture. So, technology affects people differently; it is partially dependent upon the individuals' socio-cultural backgrounds, statuses and attitudes (Schweikart, 2002:45). Different countries have different perceptions when it comes to technology; culture is one of the biggest influences at times, but it is not always the case (Erumban & De Jong, 2006:303).

Social conditions such as gender imperialism related to culture may also cause the DD, especially in developing nations (Schweikart, 2002:45). Gender inequality is often a consequence of cultural bias. Ngwainmbi (2000:537) asserts that there are definite obstacles that hinder women from accessing the internet in developing countries: For example, it is convenient to access the internet in internet cafés; however, certain religions and cultures do not allow or encourage women to visit such places. Gender is discussed in detail later in this chapter in 2.3.2.7.

#### **2.3.2.6 Age**

Older generations are viewed as 'lagging behind' when it comes to innovation (Erumban & De Jong, 2006:103). De Haan (2004:67) observes that internet skills are associated with age. Younger generations are more knowledgeable with regard to internet use; they start to use it at a young age—this gives them an advantage over older people (Rogers, 2003:37). The young are regarded as the digital generation; they obtain more advanced skills more easily (Van Deursen & Van Dijk, 2011:897). The older generation did not have the same digital opportunities; they could not obtain internet skills at school as it was not available at the time; only the young digital generation gets that exposure now (Van Deursen & Van Dijk, 2011:896). Hargittai (2005:372) argues that age difference in internet usage is only a phenomenon that is temporal because the current generation will also grow old; and even the older generations in developed communities are embracing the internet through the use of social media, and streaming of music and movies. This study focuses on younger generations, that is, students, only.

#### **2.3.2.7 Gender**

Gender has been mentioned in previous sections and seems to be a factor that is intertwined with all the other factors impacting upon the DD. Van Deursen and Van Dijk (2014:521) observe that the DD in developing nations has a definite gender component; however, they argue that there is

very little literature about it. On the other hand, Hafkin and Huyer (2007:27) posit that there is enough evidence to show that the female gender is definitely affected negatively by the DD, especially in developing nations. However, they also note that it is difficult to determine the exact number of women with internet accessibility because research fails to differentiate between actual internet access, and mere opportunity to access the internet. More in-depth research in this regard is needed (Antonio & Tuffley, 2014:677).

Van Dijk (2005:11) discovered relevant gender differences in the sense that men seem to use the internet more than women; men have more access to the internet. Wasserman and Richmond-Abbott (2005:254) agree that men's knowledge in this regard appear to be better. That is probably due to the fact that they have more access and therefore use it more. For this reason, Goulding and Spacey (2003:3) also claim that women have fewer internet related skills when compared to men. However, Schumacher and Morahan-Martin (2001:68) argue that men and women both have the same potential in terms of capabilities to use the internet; women merely develop their internet related skills to a lesser extent. Schumacher and Morahan-Martin (2001:69) say that female's attitude towards technology are often hindering them to acquire skills related to internet use. This is not the only barrier for women—gender as a DD issue is discussed further later in this chapter.

Exploring the inequalities of gender in developing countries is one of the DDs continuing problems (DiMaggio *et al.*, 2004). Developed countries are providing better platforms for women to access and use the internet; in contrast, it is a different situation in developing countries where the gender DD increases and women continues to be exploited (Antonio & Tuffley, 2014:675). Gender DD is due to lack of access and an inability and/or prohibition to use the internet (Antonio & Tuffley, 2014:675). So, a lot less women than men use the internet in developing countries (Steeves & Kwami, 2012:201). Antonio and Tuffley (2014:675) mention that studies have shown that women of developing nations rarely use the internet. Hafkin and Taggart (2001) also mention that only about 25% of women in Africa use the internet; in Asia it is as low as 22%; and a mere 38% in Latin America.

ICT adoption in developing countries is often negatively affected as a result of gender related issues. According to Wamala (2005:9), females are underrepresented in the ICT field due to certain policies; in some African countries ICT practices hinder equality between the sexes and focus remain only on one particular gender. Swaziland is a country that follows cultural traditions strictly; in the Swazi culture men have always been regarded as superior to women: as an example, Wamala (2005:10) notes that women in Swaziland are still being treated unfairly. He continues to make an observation that the ICT business in Swaziland is one of those particular areas where females get less or inadequate exposure.

Hafkin and Taggart (2001) conclude that the internet can present a great window of opportunity for women in developing nations and in Africa; it can aid them to alleviate or even eliminate the barriers that limit them from fully participating in the digital world. Yet, Antonio and Tuffley (2014:676) argue that women continue to suffer from gender related discrimination; it prevents them from accessing full ICT benefits. Antonio and Tuffley (2014:675) articulate that even in countries where women have access to proper education, they still spend less time using the internet than men do. Hilbert (2011:7) admits that even in technologically advanced African countries such as Kenya, women use the internet less than men do. Antonio and Tuffley (2014:677) declare that this results in women being less employable than men: 81.4% of Kenyan men are employed, and only 49.9% of Kenyan women are employed.

Education is one of the most powerful tools when it comes to bridging the gender gap (Van Deursen & Van Dijk, 2014:521). Pande (2012:1426) notices that women in developing countries find it difficult to attend school; they often miss out on an education due to limited time, which is a result of the cultural norms and household duties they are often subjected to.

#### **2.3.2.8 Cost**

Antonio and Tuffley (2014:135) state that an internet connection can cost up to 40% of the average annual income of an individual in developing countries. Reliable telecommunication networks may also not be available in rural areas because it is not profitable for companies to invest there (Antonio & Tuffley, 2014:678). Cecchini and Scott (2003:79) argue that developing countries struggle to establish trustworthy telecommunication networks; this is due to problems with electricity provision, unaffordability and unemployment. Sinha (2005:4) argues that that access to mobile phones can help to improve the livelihood of people; mobile phones are becoming more affordable and accessible, particularly in developing countries. However, mobile phones are worthless without telecommunication networks that support them.

Peters (2005:144) states that solutions that worked in developed nations cannot necessarily be successfully duplicated in developing countries. He further states that solutions must be based on an understanding of what is happening in the specific environment and what the unique conditions are. Higher incomes enable individuals to afford latest technology mobile phones. Swaziland struggles with high unemployment rates—the youth unemployment rate in Swaziland is currently about 50% (Mndzebele, 2013:182). Mndzebele (2013:197) highlights that only half of the unemployed youth have ICT-related qualifications.

### **2.3.2.9 Rich and poor areas**

Ngwainmbi (2000:537) notices that African countries are beset by civil wars; these governments are more interested in securing ammunition, than in technology to reduce the DD. These countries remain poor in their entirety due to these ongoing wars. In other African development countries, most of the technological infrastructures are found in the urban and relatively rich areas (Sinha, 2005:10). Ngwainmbi (2000:537) conducted a survey on the DD as it relates to internet connectivity in South Africa; he found that most of the remote rural areas have underdeveloped telecommunication infrastructure that barely offer internet connectivity. According to Smith (2000) one of the main factors that are hindering internet access in poor communities is often remote geographic location. So, Chen and Wellman (2004:41) agree that substantially more people in urban communities adopt and utilise ICT, than in rural communities.

Furuholt and Kristiansen (2007:2) argue that obstacles such illiteracy and poverty prevent people from accessing the internet and computers. According to Henry (2004) the poor are often part of minority ethnic groups. Hafkin and Taggart (2001:33) note that income and education levels of individuals in rural areas tend to be lower. Henry (2004) mentions that at least 1.4 billion people worldwide are surviving on less than US\$1.25 per day; about 70% of these individuals live in rural communities in developing countries. Ali (2011:239) posits that bringing the internet to African villages by utilising batteries to operate computers and satellite access might seem to be a good idea, but these are not suitable technologies for such poor communities. Cullen (2001:312) mentions that solutions for poor societies must be based on basic technologies; such technologies must be sufficient to promote and improve traditional forms of education, improve access to healthcare, and also improve animal farming and crop cultivation.

Cullen (2001:312) states that one of the premises of the DD is that the wealthy can afford to buy technology and have the necessary skills to utilise it, while the poor continue to struggle with illiteracy and poverty as a result of the DD. Henry (2004) further notes that people assume that the DD will disappear when poverty is reduced. He also argues that political leaders have failed to eradicate poverty in most developing countries and are now hoping to improve standards of living through global trade and by obtaining the latest technologies. However, this will fail because the people lack the skills to operate these technologies. Venkat (2002:1) contemplates whether the DD contributes to or even creates poverty; since uneven income remains a factor in developing countries, those that are wealthy can (and will continue to) afford new technologies and are thus the only ones that benefit (and will continue to benefit). Henry (2004) argues that rural areas can only be reached, and technology be made available to them, through sufficient economic growth. According to Mariscal (2005:414) the following are needed to eradicate poverty and ensure

economic growth to bridge the DD in rural areas: research and development; access; education; delivery of public services; local content; business processes and production efficiency; and data collection reliability.

#### **2.3.2.10 Technology acceptance**

The willingness to use technology does not exist in developing countries because it is not widely available (Davis *et al.*, 1989:319). According to Jamwal and Padha (2009) performance of workers depends on their willingness to accept given systems. Acceptance of a given technology improves quality of work; technology acceptance depends upon ease of use (Davis *et al.*, 1989:319). Van Dijk and Hacker (2003:319) argue that users better understand technologies that they can easily relate to. Required skills should, therefore, be taught timeously to people in the workplace.

Various factors contribute to technology acceptance. Jamwal and Padha (2009) argue that elderly people tend to resist learning new technologies. Davis *et al.* (1989:322) agree that there is a negative correlation between age and internet usage. Chen and Chan (2011:5) observe that females tend to have a negative attitude towards technology; this may be due to lack of interest, lack of opportunities, or gender inequality. Uneducated people also struggle to accept technology; they often fail to see the usefulness of technology (Jamwal & Padha, 2009). Low income also negatively impacts upon technology adoption; people cannot adopt what they cannot afford (Venkatesh & Morris, 2000:119). The DD is widened when technology is not adopted, hence, technology adoption and acceptance are crucial to lessen the DD.

#### **2.3.2.11 Mobile technology**

According to Davis *et al.* (1989:985), it is expensive to make both local and international voice and data calls in most African developing countries. Affordability impacts upon internet access and usage (Roycroft & Anantho, 2003:71). Antonio and Tuffley (2014:677) recommend that telecommunication providers and policy makers work together to make the internet affordable and accessible, particularly on mobile phones. Sinha (2005:6) notes that mobile phones can potentially bridge the gap of the DD, due to their affordability and accessibility. Still, Scott *et al.* (2004:6) express that, due to the inequality of income in developing countries, it is still only high-income earners that can afford to own a mobile phone. This is usually the case in countries where ICT is only implemented late (Samaan, 2003).

Due to the scarcity of mobile phones in poor rural communities individuals that own mobile phones usually share it with family members and friends (Waverman *et al.*, 2005:10). According to Woolcock and Narayan (2006:33), a study in India revealed that in the rural communities of the country, a mobile phone is not just a personal device that one person uses for his/her own

communication needs; it is seen as a collective means of communication and shared with close relatives and friends.

Ling (2002:30) declares that prices of network coverage and mobile phones increase in rural areas once people start to use it. Aker (2008:4) expresses that this can be enhanced by means of healthy competition and privatisation. Li and Xu (2002:442) argue that mobile and telecommunication companies must have competition to ensure that customers are not taken advantage of. They also say that mobile phones are more in demand (when compared to land lines). Duffy-Deno (2001:284) says internet access on mobile phones that are not price sensitive; it should be.

A mobile telephone network, i.e. MTN, is a South African based company; it features globally and is one of the best performing companies in South Africa (Wagiciengo & Belal, 2012:35 ). MTN attempted to establish a footprint in Swaziland; it was prevented by Swaziland Post and Telecommunications Corporation (SPTC) from joining the wireless market; SPTC successfully protected its monopoly (Sutherland, 2015:479). This mobile company was the only one the country has ever known since the introduction of wireless telephone networks in Swaziland. Metfula and Chigona (2012:5) add that it is known to be the only mobile telecommunications company in Swaziland that has the rights to operate there. Other mobile technology companies have also failed to enter the mobile market; for example, Swaziland Post and Telecommunications was also prevented from entering the market. One mobile company called Swazi Mobile joined MTN after a long period of monopoly; there are now two mobile operators in Swaziland.

According to Sutherland (2014:386), the mobile devices bought from SPTC are no longer working, and no compensations have been given by SPTC to individuals that had purchased them. The competition was quickly eliminated, with immediate effect. MTN's data costs are still very high and need to be reduced (Muthien & Khosa, 2002:367). Call (voice) costs are also significantly high (Sutherland, 2015:481). An SPTC to MTN call is expensive when compared to SPTC to SPTC, or MTN to MTN; international calls are also more expensive when using MTN, than when using SPTC since SPTC owns the international gateway (Sutherland, 2014:384).

MTN Swaziland has the highest data prices when compared to MTN South Africa, MTN Ghana, MTN Cameroon and MTN Rwanda (Rwanda Cell) (Gillwald, 2012:20). Swaziland has the second lowest internet downloading speed when compared to other African countries (Gillwald, 2012:22). The average worldwide speed is more than double than that of Swaziland (Gillwald, 2012:22). In most cases people access the internet at their place of work; only the few that can afford it visit an internet café (Pénard *et al.*, 2015:71).

### **2.3.2.12 Telecommunications**

Garbacz and Thompson (2007:277) note that economic growth and living standards remain linked to the use and availability of telecommunication in developing countries. Telecommunications can be a great force to create opportunities for people and propel countries into the global economy (Garbacz & Thompson, 2007:276). Telecommunication infrastructures are vital when it comes to economic growth and development in developing countries (Van Dijk, 2005:185). According to Kenny (2001) slow telecommunications development, high telecommunication tariffs, and high telecommunication costs are a few of the factors affecting the connectivity of the internet in African developing countries. Annan (1999:109) states that the World Bank wanted to implement policies to force Internet Service Providers (ISP's) and network telecommunications companies to lower the costs of their devices and services. Li and Xu (2002) notice that international calls are reduced in developed countries such as the United States of America, while in developing countries call tariffs are ever increasing.

Mariscal (2005:414) says that competition and privatisation of mobile and telecommunications can ensure expansion of the economic status in specific areas in developing countries. Chisenga (2000:178) stipulates that competition among ISP's in developing countries can be an effective way to bridge the internet problem; it can lower costs, remove monopolies, and enforce genuine competition. Roycroft and Anantho (2003:72) say that all should have telecommunication services because it enables people to connect to other people and to information.

## **2.4 Summary**

Factors such as low income, poor government infrastructures, education, poor versus rich communities, social and economic status, gender and age contribute towards the DD. Income, being one of the main factors, links with the socio-economic status of a country. If the economy is not growing, due to lack of proper ICT infrastructures, people in that country suffer in terms of income and other socio-economic factors. Education without ICT is almost impossible in today's world; countries without ICT become isolated. When schools cannot afford basic computers and internet services, then there is a DD which will continue to grow. People are impacted negatively and governments must act timeously and appropriately. This chapter motivated that the DD exists. It defined the DD and discussed causes and effects of the DD. It aimed to create a shared understanding in terms of the DD, particularly in developing countries such as Swaziland.

# CHAPTER 3: SOFT SYSTEMS METHODOLOGY

## 3.1 Introduction

The aim of this study was to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also aimed at determining what efforts can, according to these students, be done in Swaziland to help bridge the gap of this technological divide. Soft systems methodology (SSM) guided the formulation of interview questions for this study. It was also used to facilitate data analysis and presentation of the results; for this, it was applied in combination with an interpretive research method (grounded theory). It was applicable because, as an example, grounded theory and SSM have similarities that can be exploited to explore participants' beliefs and values; they both share philosophical assumptions of the interpretive research paradigm (Durant-Law, 2006). This chapter positions SSM in this study. It also gives an overview of SSM and summarises the application thereof in this study.

## 3.2 The position of soft systems methodology in this study

When carrying out social analyses, the aim is to understand, in order to suggest intervention(s) to improve a problematical situation and affected people involved in such situations/interventions. SSM enables structuring of a process, for example, structure a study, to understand a situation/context; and/or to address identified problem(s) (Checkland & Poulter, 2010:213). This is shown through Figure 3-1.

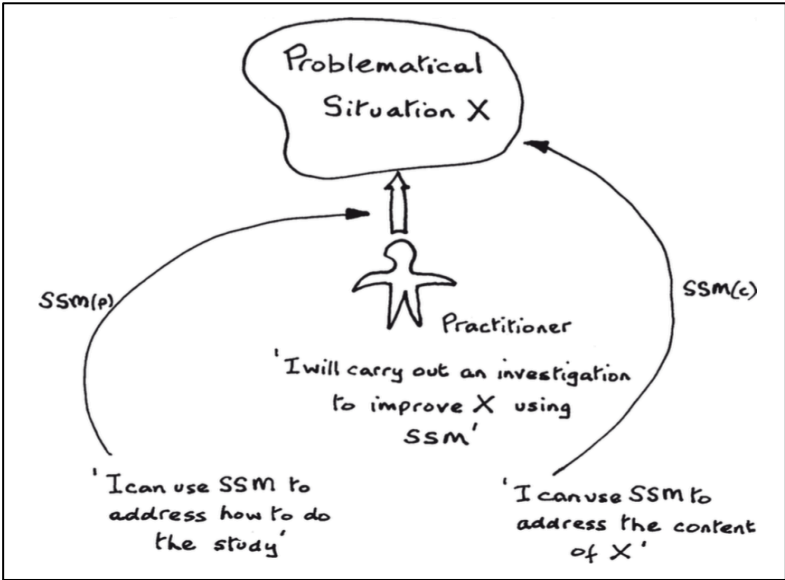


Figure 3-1: Applying SSM (Checkland & Poulter, 2010:214)

SSM is useful in systems research (Huaxia, 2010:157) and information systems researchers have applied it successfully (Checkland & Poulter, 2010). One of SSM's strengths is its practical

usability in various situations and by individuals that do not have any technical backgrounds or interest in the method applied (Mingers & Taylor, 1992:321). It is important for this study that: SSM can be applied to understand complex social problems and organisational contexts, and that it facilitates understanding of different perspectives of people that are subjected to a specific problem/situation (Maqsood *et al.*, 2001:1). It enables a researcher to apply a structured (systems) framework to facilitate practical understanding (Sensuse & Ramadhan, 2012:18).

Even though SSM can be applied to define specific improvement actions and act purposefully to *improve* problem contexts (refer to **Figure 3-1**), it was not applied for this purpose in this study. In this study, the researcher applied SSM to facilitate understanding of students' perspectives of the DD in Swaziland. Even though the outcome can be interpreted as ways to improve the DD in Swaziland, the researcher did not attempt to act upon or implement any recommendations. The reader is reminded that the scope of this study is limited to understanding the perspectives of Swaziland's students of the DD. So, SSM was employed in this context only. Hence, in this study, the development of interview questions was guided by SSM (refer to Chapter 4), it aided data analysis (refer to Chapter 5) and results were presented by means of SSM techniques (refer to Chapter 6). All the stages of an SSM approach are discussed in this chapter and toward the end of the chapter, the researcher comments on the application of the ones utilised in this study.

### **3.3 Soft systems methodology**

According to Platt and Warwick (1995:19), SSM was developed consistently over more than 25 years in the research world. Jackson (2003:4) says that Peter Checkland created this methodology, and formulated it in 1981 at the University of Lancaster in the United Kingdom. Checkland (2000b) defines SSM as a cyclical learning framework that utilises models of human activity to investigate real-world problems. Mehregan *et al.* (2012:427) also refer to it as a systems-based methodology for handling real-world issues. Checkland (2011:497) posits that SSM was used to create conceptual models to achieve structural thinking for complex situations that people are subjected to. SSM can empower a researcher (and participants) to understand alternative points of views, in order to solve a problem through learning. Furthermore, it helps to bring out an understanding of different situations to help identify solutions for them.

According to Huaxia (2010:157) SSM seeks to learn; it values the social contexts of all relevant participant groups, rather than attempting to solve a (one-sided) pre-characterised issue. It also assists with decision making; so, a researcher can improve processes of decision making during (throughout) a study (Torlak & Müceldili, 2014:326). In SSM the 'soft' refers to the people dimension in a social context, that is, the people and how their thinking relates to situations and each other; 'systems' refer to relevant resources, objects, and relationships; and 'methodology'

refers to an arranged manner of thinking—so, this is a systematic way of thinking to understand a situation (Torlak & Müceldili, 2014:327). Hence, SSM is a well-organised system of learning. It employs conceptual models (for example rich pictures) of human activity systems for social analyses.

### 3.4 Human activity systems

SSM first enables people to learn in their own unique ways; so, it is applied in complex situations in order to try to understand it (Checkland & Poulter, 2010:193). Secondly, it ensures that learning is structured; so, it advocates use of relevant questions to explore real-world situations to understand peoples’ purposeful actions. It is then modelled conceptually as human activity systems; the diverse worldviews of all participants are to be incorporated (Checkland & Poulter, 2010:193). Human activity systems enable visual illustration of complex situations. For example, the SSM cycle for learning is illustrated in Figure 3-2.

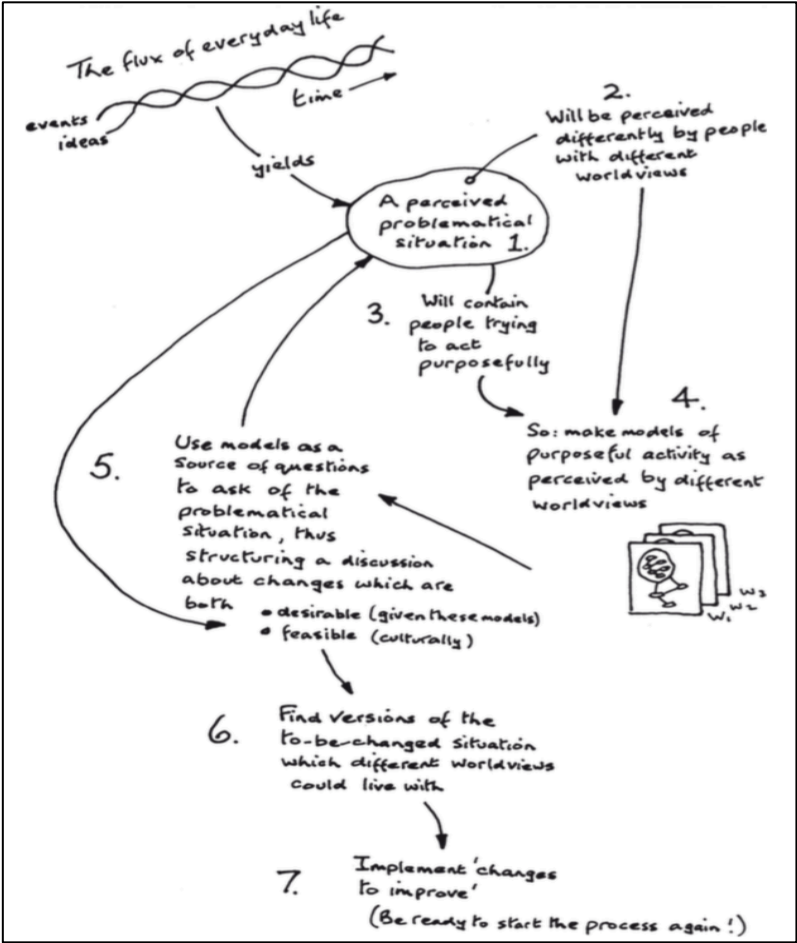
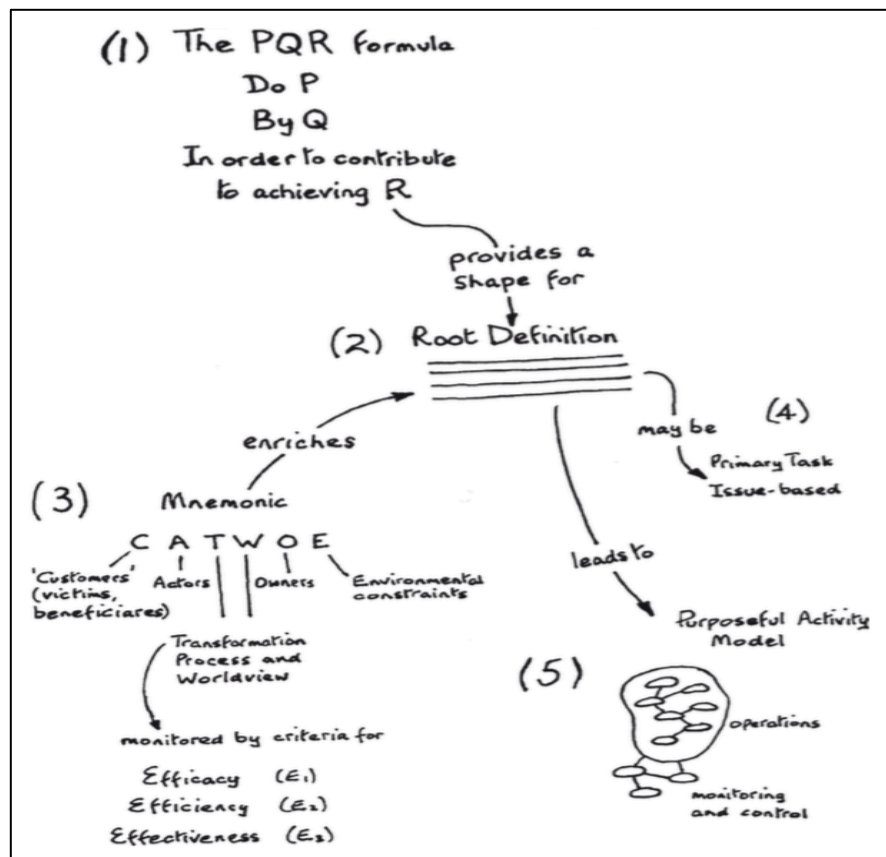


Figure 3-2: The SSM cycle for learning (Checkland & Poulter, 2010:194)

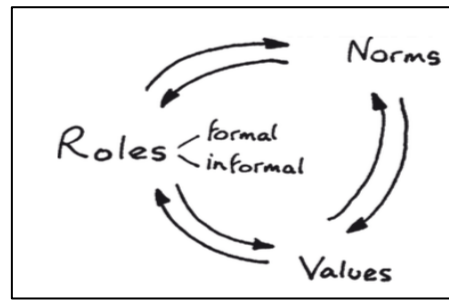
A human activity system is developed by considering a number of inputs. For example, a root definition (RD) is a sentence that describes the best possible system of human activity, such as its

purpose, who are involved, who are affected, and who influence it. A RD is formulated by considering CATWOE, that is, weltanschauung (worldviews), customers, the required transformation, actors, environmental constraints, and owners (Mehregan *et al.*, 2012:428). It is shaped according to *what* is to be achieved *how* and *why*. Checkland and Poulter (2010:19) disclose that these are described by the ‘PQR formula’ where P (*what*, that is the purpose) must be done according to Q (the transformation process) to achieve R (*why*, the reason for change). Wang *et al.* (2015:565) add that PQR aids reflection on questions such as: What does the system do? How does the system do it? Why does the system do it? So, RD describes needed transformation required in an environment (Couprie *et al.*, 2001). It is illustrated in Figure 3-3.



**Figure 3-3: Development of a human activity system (Checkland & Poulter, 2010:220)**

The process of improving an investigative situation incorporates changes which are desirable and, most importantly, which are culturally feasible. Feelings of humans are explored to make practical sense of a society, through the use of an SSM model (Checkland & Poulter, 2010:214). The model comprises of values and norms, as shown in Figure 3-4.



**Figure 3-4: The cultural context of a human situation (Checkland & Poulter, 2010)**

Roles may represent, for example, social positions that point out the differences between group members; for example, junior employees, support staff, head of departments, and chief executives may have different norms/values based on their respective roles within an organisation. Norms are expected behaviours which aid to define a role; values are defined as standards whereby to judge if behaviour-in-role is appropriate (Checkland & Poulter, 2010:215). As an example, a leader should ideally not act emotionally when addressing employees to point out misconducts. Formal and/or informal norms and values of participants were not explored for this study—the participants were regarded as a relatively homogenous group, since the aim of the study was to explore the perceptions of *students* in *Swaziland*. Hence, potential dissimilar groups (such as parents, lecturers, government officials to mention a few) and students from other countries were not included.

### **3.5 The soft systems methodology stages**

At the heart of SSM is the desire to model the actual (real, problematic) world versus how the world could/should be. It aids understanding as to how to improve the situation. The seven stages to achieve this, as modeled by Checkland (2000b:163), are illustrated in Figure 3-5. They provide a way to address real-world issues; it is a step by step approach that aims to provide solutions. The stages are briefly discussed next. Stages 1 to 3 are relevant to *understand* a problematical social context; stages 4 to 7 are relevant to *improve* the social situation.

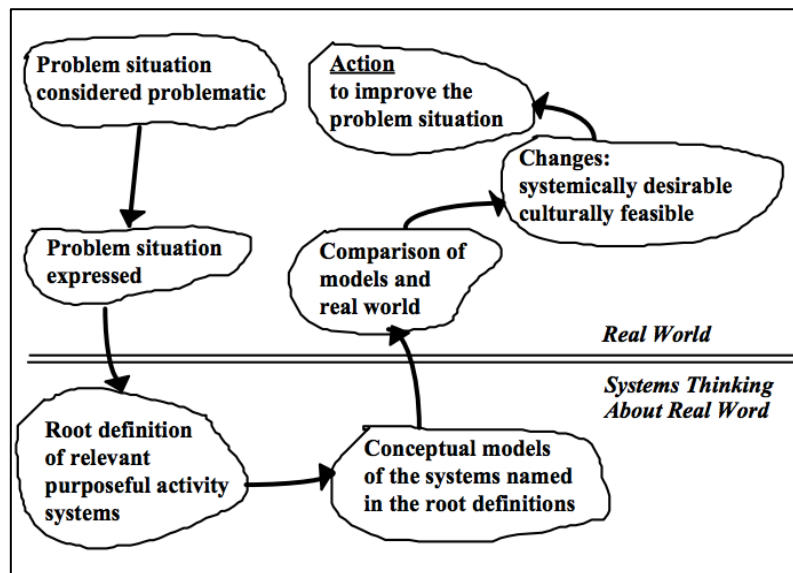


Figure 3-5: The SSM stages (Checkland, 2000b:163)

### 3.5.1 Stage 1: Identify the (unstructured) problematical situation

The first stage entails identification of the problematic situation and context to be improved upon. There must be people that are affected by the problem context (Checkland, 2000b:163).

### 3.5.2 Stage 2: Understand relevant worldviews and depict them in rich pictures

Worldviews of participants must be understood; the researcher must determine the participants' perceptions of the problem being investigated. These are portrayed using rich pictures. Rich pictures give a comprehensive and visual representation of complex frameworks and afford good visual communication and a straight to the point general view of complex (problematic) systems (Couprie *et al.*, 2001). Such rich pictures capture processes that are on-going, viewpoints and structures in a situation, main entities, the latest identified problems and potential new problems (Checkland & Poulter, 2010:210). A rich picture is an excellent way to show relationships and is regarded to be much better than prose. Wilson (2001:36) argues that the advantage of using pictures rather than text is that a picture can represent information as it is processed, that is, in parallel, while text is only presented in a serial (has to be read) stature. According to Wilson (2001:35), it describes a situation literally and accurately. Couprie *et al.* (2001) state that, when constructing a rich picture, there are no rules that state specific aspects to be considered as a priority, and no specific syntax; only important and key considerations are to be highlighted in rich pictures. Rich pictures reveal in most cases different kinds of interpretations allowing observers different interpretations (Champion, 2010). A rich picture must depict objective ideas such as displaying characters and characteristics which bring out human nature and various points of views (Monk & Howard, 1998:26).

Checkland and Poulter (2010:209) note that every rich picture is constructed by talking to people, reading documentation, and conducting formal interviews. Rich pictures are usually displayed in cartoon-like formats (Naughton *et al.*, 1984) that encapsulate a simulation of a real-world issue, show relationships, layout connections as well as cause and effect (Monk & Howard, 1998:25). Figure 3-6 is an example of a rich picture. Its interpretation is discussed next.

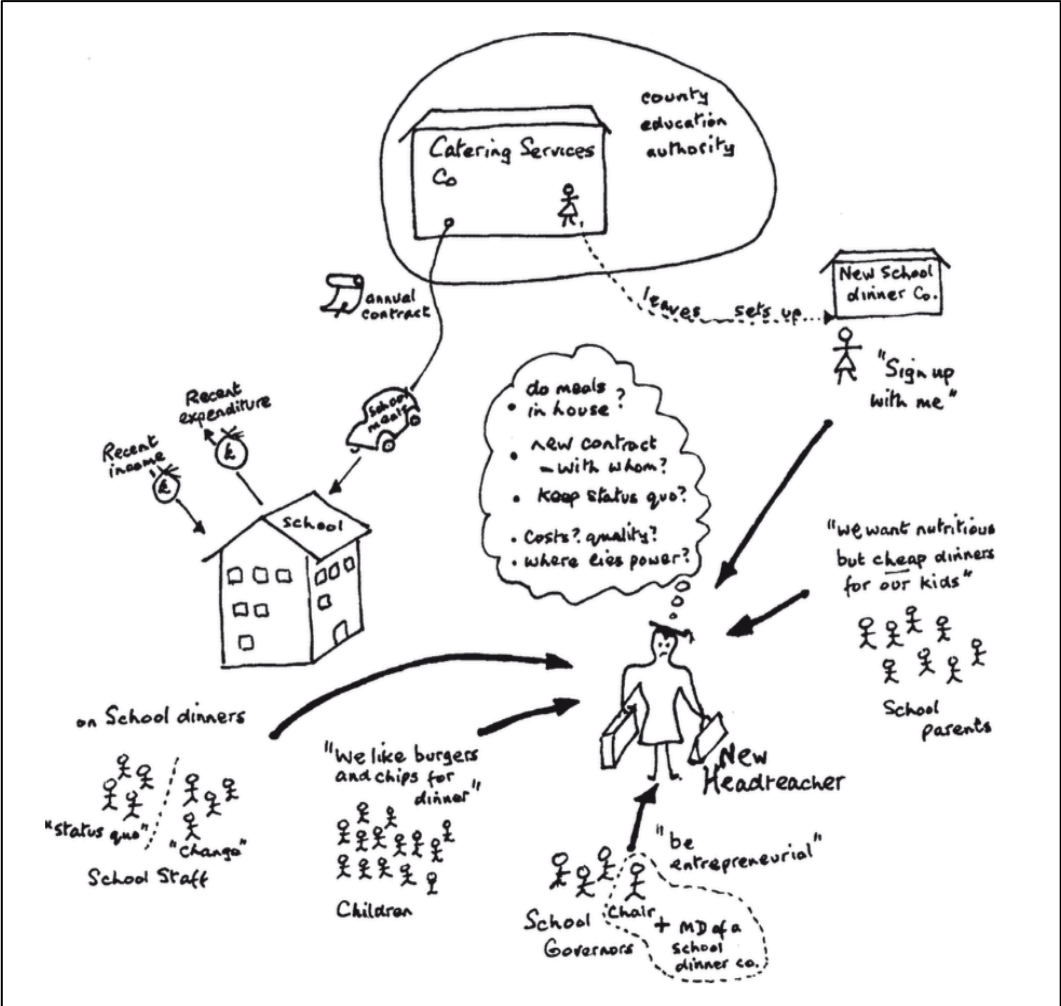


Figure 3-6: Example of a rich picture (Checkland & Poulter, 2010:210)

Checkland and Poulter (2010:210) explain that this rich picture is an example of scholars that are between the ages of 11 and 18. The problem outlined is that the school is facing issues such as the provision of school meals. The school just got a new principal. The education authority is responsible for offering catering services. A member from the catering service is urging the head teacher to give a tender to him as he is starting his own catering company. The school children want to be offered burgers and chips while some parents want more nutritious food which will be affordable and offer health benefits to their children. The school governor is persuading the principal to take full responsibility for the catering services at the school and become entrepreneurial, for the school to make profits. The school staff is divided and concerned about

this decision, as some of them prefer the old system of catering while others are up for a change (Checkland & Poulter, 2010:210). This demonstrates how a paragraph of prose can be portrayed, and put into context, visually, accurately and neatly in picture format.

### 3.5.3 Stage 3: Create root definitions

The third stage entails formulation of a root definition (RD). A RD is a sentence that describes the best possible system of/for human activity, such as a definition of its purpose; it defines, for example, who is involved, who is affected, and who influences it. According to Checkland and Poulter (2010:18), SSM users define organised processes for learning and enquiry using models of purposeful activity. These models are used to enquire about real-world situations. This type of model looks at complicated reality. It models, for example, that people attempt to act purposefully in most things that they do. RD's are essential for promoting transformation in an environment (Couprie *et al.*, 2001). Checkland and Poulter (2010:19) state that the 'PQR formula' where P (*what*, that is, the purpose) must be done according to Q (*how*, that is, the transformation process) to achieve R (*why*, that is, the reason for change). The following is an example of how a root definition can be created, where the PQR formula is applied; it is based on the rich picture in Figure 3-6:

P = *“Governor is persuading the principal to take full responsibility for the catering services at the school”, and “Children want to be offered burgers and chips while some parents want more nutritious food”.*

Q = *“Open a catering service for the school”.*

R = *“Offer food with health benefits to the children”, and: “Raise funds to make profits for the school”.*

Furthermore RDs are developed by considering the elements of CATWOE, that is, weltanschauung (worldviews), customers, transformation, actors, environment, and owners (Mehregan *et al.*, 2012:428). Wang *et al.* (2015:565) explain the CATWOE elements as follows: customers (those affected by the transformation), actors ('do' activities required for transformation), transformation (details of the change needed), worldviews (views that affect, for example, how/why people act in a specific manner), owners (have power to halt transformation), and the environment (that perhaps constrains improvement). So, a transformation (T) ought to be understood in the context of diverse worldviews (W) of actors (A) and/or owners (O) and/or customers (C), as well as within given constraints of the environment (E) (Checkland & Scholes, 2000:35). It is illustrated in Figure 3-7.

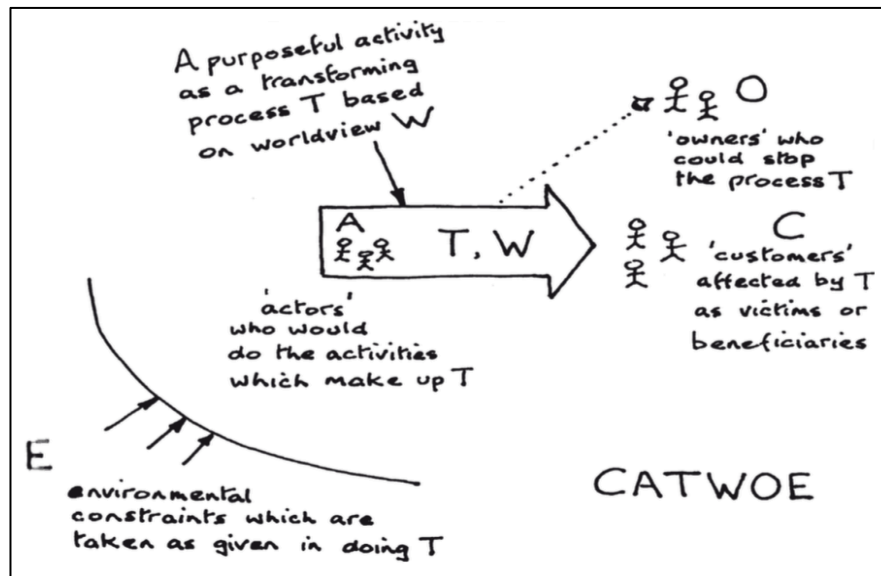


Figure 3-7: The CATWOE mnemonic (Checkland & Poulter, 2010:221)

### 3.5.4 Stage 4: Develop and test conceptual models

The fourth stage deals with the construction of the conceptual framework. When a researcher formulates a conceptual model he/she must analyse all the activities taking place; consider all the factors contributing to a problem; and take worldviews of all relevant actors, customers and owners into account (Couprie *et al.*, 2001). Only activities performed by actors from the RD should be included in the conceptual framework. All activities should start with a verb. Activities should be listed and prioritised (Gasson, 1994:7). Only activities that achieve objectives should be included (Champion, 2010). To ensure that the system works sufficiently, all activities should graphically relate to feedback and monitoring thereof (Gasson, 1994:8).

### 3.5.5 Stage 5: Comparison of real world model and conceptual models

This stage compares the (ideal) conceptual model and (problematic) real world. It defines change required to improve the problem context. It details recommended, prioritised improvement actions (Gasson, 1994:8).

### 3.5.6 Stage 6: Analysis of desirable and feasible change

This stage considers the individuals that will be affected by the changes that are to be made to the system (as per stages 4 and 5). It also includes those(actors) that must implement changes (Couprie *et al.*, 2001).

### 3.5.7 Stage 7: Act to improve the situation

This stage entails the implementation and monitoring of actions as per the conceptual models.

### 3.6 The application of SSM in this study

Only stages 1 to 3, as they are concerned with the understanding of a problem context and, therefore, applicable to the scope of this research, were applied in this study. It is summarised in Table 3-1.

**Table 3-1: SSM stages applied in this study**

SSM stage	Application in this study
Stage 1	Chapter 2 contains a literature review of a DD, specifically in developing African countries such as Swaziland. The participants in this study are detailed in Chapter 5, Section 5.2.
Stage 2	A rich picture was used in the study to show the participants' perspectives towards the DD; this is illustrated in Figure 6-1 of Chapter 6.
Stage 3	CATWOE guided the development of interview questions—refer to Section 4.6.2 in Chapter 4. The researcher explored the perspectives of the students through the theoretical lens of SSM; so, CATWOE guided the formulation of themes—refer to Chapter 5, Section 5.4.7. The outcome of the study is detailed in Chapter 5, Sections 5.4.7.1, 5.4.7.2, 5.4.7.3, 5.4.7.4 and 5.4.7.5. The root definitions assisted to formulate the perceptions of the students towards the DD in Swaziland; refer to Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4. Refer also to Section 6.4.

### 3.7 Summary

Social analyses can benefit from SSM, a systems approach that aids in the understanding of complex situations. Techniques such as human activity systems, root definitions and a rich picture visually illustrate understanding of complex social phenomena. SSM gives guidance regarding transformation for improvement. This chapter provided an overview of SSM; it also positioned SSM in the study. Not all the SSM stages were applicable in this study. This chapter motivated and detailed which stages were applicable and hence applied in this study. The next chapter shows how SSM was integrated in to the research plan.

## **CHAPTER 4: THE RESEARCH PLAN**

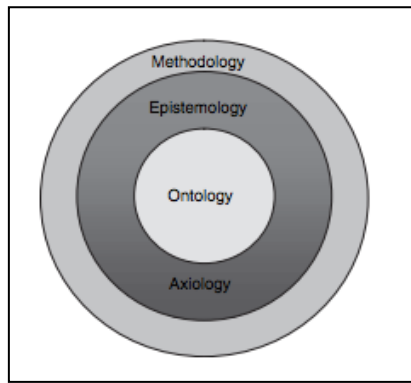
### **4.1 Introduction**

The aim of this study is to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also determines what efforts can, according to these students, be made in Swaziland to help bridge the gap of this technological epidemic. This chapter's objective is to discuss the research plan whereby the empirical study was conducted. Relevant research paradigms in the general field of study are positioned in terms of philosophical underpinnings; they are briefly discussed in order to motivate the chosen paradigm. This study was done in the interpretive paradigm which is discussed in more detail in this chapter. SSM was integrated with a more traditional interpretive research approach. This is in accordance with research done by, for example, Durant-Law (2006:20). He argues that rich pictures can be an end product depiction of a problem extracted from an interpretive research method, for example, themes can be extracted using SSM and conceptual models then developed using grounded theory, and vice versa.

### **4.2 Philosophical underpinnings of research**

According to Neuman (2011:94) a paradigm can be well understood as an entire system of thinking. Different philosophical beliefs result in different research paradigms. Paradigms can be referred to as sets of beliefs which usher action (Rubin & Babbie, 2016:33). Mouton (1996:203) stipulates that a paradigm can also be referred to as traditions of research establishments in certain areas/disciplines. Research philosophies play an important role in the intellectual affairs of humans (Hughes & Sharrock, 1997:429). For example, Easterby-Smith *et al.* (2012:88) highlight that researchers must explore philosophical underpinnings to appropriately formulate a research strategy and identify limitations early in the process.

Myers (1997:3) stipulates that every research study is based on assumptions in terms of: what contributes to valid research and which research methods are suitable to achieve the research aims. Proctor (1998:78) also stipulates that there must be a balance between the research questions and objectives, and the research methods chosen. Philosophical underpinnings of research paradigms correlate with assumptions established from attributes such as the nature of relevant knowledge and how to best obtain knowledge. Research paradigms are classified according to ontological and epistemological assumptions (and both are influenced by axiological assumptions); they, in turn, dictate the researcher's methodology choice (Lee & Lings, 2008:11) as illustrated in Figure 4-1.

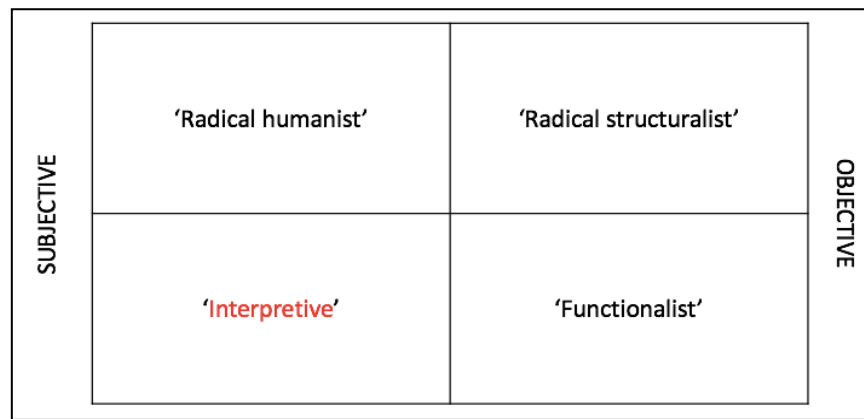


**Figure 4-1: Paradigm framework diagram (Lee & Lings, 2008:11).**

Ontology is concerned with the nature of a particular phenomenon in the process of investigation (Morgan, 1980a:10). Flowers (2009:1) stipulates that ontology is also known to be the nature of reality. Lee and Lings (2008:10) posit that ontology can be viewed or thought of as a set of convictions about what the world being studied actually is. Creswell (2009:20) also agrees that ontology refers to the nature of reality, inclusive of its characteristics. Ontology thus defines what is viewed as valid knowledge. Epistemology refers to knowledge and how it can/should be acquired and/or used (Myers, 1997:4). Flowers (2009:1) articulates that it is known to be the nature of knowledge. It is concerned with sources of knowledge and the perceived limitations of knowledge (Hallebone & Priest, 2008:86). Axiology is a philosophical branch that studies judgements about value (Li, 2016). So, ontological, epistemological and axiological assumptions of a research paradigm (and researcher) are very important because they dictate what constitutes knowledge, how knowledge can/should be obtained, and what is/should be regarded as valuable. Lee and Lings (2008:10) say that methodology refers to how a researcher is conducting a research study; it is dictated by the relevant assumptions made regarding axiology, ontology and epistemology.

### **4.3 Research paradigms**

The four paradigms of social theory analysis (radical humanist; radical structuralist; interpretive; and functional) as defined by Morgan (Morgan, 1980a:24), are all relevant and suitable to study social aspects in/of information systems/technology fields; refer also to **Figure 4-2**. These are briefly discussed next; the researcher comments on the suitability of each for this study.



**Figure 4-2: The four paradigms of social theory analysis (Morgan, 1980a:22)**

The functionalist paradigm is said to be the most dominant of the four paradigms as it is often used in organisational studies and popular with academics; behaviours of individuals in organisations are analysed through hypothesis testing (Morgan, 1980a:28). In this paradigm social matters are deterministically investigated from an objective view point; gathered data are accepted to be neutral/unbiased. The functionalist paradigm is not suitable in this study as the researcher explores the (subjective) perceptions of students towards the DD in Swaziland to determine how they feel the DD impacts them.

The radical structuralist paradigm also aims to investigate matter from an objective view point (Morgan, 1980a:33). Researchers aim to investigate, for example, immanent clashes within a society that produce steady change brought about by economic and political emergencies (Morgan, 1980b:34). For this they focus on basic connections within the bounds of a realist social world; draw attention to the way that radical change is incorporated in the structure and nature of contemporary society; and attempt to clarify interrelationships that are part of social developments (Morgan, 1980a:34). Radical structuralism is related to structural conflict; it commits to radical change, deprivation and contradiction that occur within an investigation (Morgan, 1980a:34). This study is concerned with a social phenomenon that negatively impacts society; however, the aim is not to clarify interrelationships and bring about structural change. This study's aim is to understand the perceived effects of the DD on students in Swaziland. This paradigm is thus not suitable.

The humanist paradigm is characterised by radical change from a subjectivist point of view (Morgan, 1980b:34). Researchers also use it to bring about revolutionary or progressive change (Gioia & Pitre, 1990:591). The humanist paradigm looks at the social world through a perspective lens of anti-positivism and stresses the significance of rising above all existing social limitations (Morgan, 1980a:32). The humanist paradigm looks to change the social world through an adjustment in methods of consciousness and cognition (Morgan, 1980a:33). It is not the aim of

this study to change the social world and make people think differently; this paradigm is thus not suitable.

Interpretive researchers presume that access to reality is only accessible through social constructs such as shared meaning and language (Myers, 1997:5). Interpretivists look for clarification inside the realm of individual awareness and subjectivity, that is, from the perspectives of individual participants, rather than by observing activity (Morgan, 1980a:28). Interpretivists focus on human complexity to make sense of the situation at hand (Kaplan & Maxwell, 2005:31). The aim is to comprehend the world as it may be, and get to know the social world from various (subjective) viewpoints (Morgan, 1980a:82). This study aims to understand the (subjective) perceptions of students towards the DD in Swaziland, making the interpretive paradigm suitable for this study.

#### **4.4 Interpretive research as applied in this study**

According to Klein and Myers (1999:67) interpretive research assists researchers to gain a deep understanding of social phenomena and the humans engaging in them. It aims to facilitate understanding of individuals through the meanings that they attach to the phenomena (Klein & Myers, 1999:69). Interpretive researchers usually begin their study with certain assumptions towards the phenomena they study (Myers, 1997:6). These may be grounded, for example, in the literature. Methods such as focus groups, interviews and questionnaires are applied to gather data from participants (Klein & Myers, 1999:81).

The researcher applied a traditional interpretive research approach (grounded theory) and SSM in a complementary manner in this study. According to Glaser and Anselm (2017:5) grounded theory originated in the field of sociology. It was created by two sociologists, Glaser and Strauss (Glaser *et al.*, 1968). Creswell (2009:13) stipulates that its purpose is to discover or generate a theory; the theory is obtained by studying phenomena. Grounded theory entails systematic observation of qualitative data in order to generate meaningful theories (Martin & Turner, 1986:142; Strauss & Corbin, 1990:16). Theories are generated when data are analysed using a coding method. Different levels of coding exist, such as open coding, axial coding, and selective coding (Gasson, 1994). Coding may be somewhat subjective, since the researcher chooses the concepts that he/she focuses on. New data gathered, and new codes that emerge must thus be constantly compared to previous sets of data and codes so as to ensure consistency when coding and categorising. Durant-Law (2006:18) agrees that grounded theory is useful to examine socially constructed problems; knowledge is acquired by means of reasoning and making sense of a situation. So, researchers must understand participants' transcriptions and create codes that pave a way for meaningful categories. He also argues that SSM complements and gives structure to interpretive research. SSM is discussed in Chapter 3.

#### 4.5 Principles for interpretive research

It is important that a study delivers absolute trustworthiness from all angles of its research findings; the research steps must ensure that participants' perspectives are reliably gathered and accurately represented through the findings; for example, a study must be auditable, credible, confirmable and transferable (Lincoln & Guba, 1985).

Seven principles for interpretive research were created by Klein and Myers (1999:72) to evaluate interpretive research in the fields of information systems—the aim is to ensure that the interpretive research is valid and rigorous.

They formulated the principles to support the philosophical aspects of hermeneutics and phenomenology, and explain them as follows: First, the fundamental principle of the hermeneutic circle refers to “relationships between the whole and its parts, i.e. a holistic manner to understanding text by understanding the whole, as well as its individual parts and their reference to the whole”. Second, the principle of contextualisation refers to “reflection in terms of the historical background and enables understanding of how a situation came to be”. Third, the principle of interaction between the researches and subjects “explains how data is to be gathered through interaction between the researchers and participants”. Fourth, the principle of abstraction and generalisation refers to “the understanding of human nature and society as described through interpretation(s) of gathered data; the aim is to infer valid general/universal ideas from single cases”. Fifth, the principle of dialogical reasoning refers to “the dialogue between the researcher and participant in order to enable the researcher understand the participant’s viewpoint”. Sixth, is the principle of multiple interpretations”; it argues that “different participants may have different interpretations regarding the situation being researched and these must all be considered”. Seventh, the principle of suspicion implies that “there is always a possibility of false/biased responses from participants; care should be taken to ensure that such responses should not distort results” (Klein & Myers, 1999:72). Table 4-1 illustrates application of these principles in this study.

**Table 4-1: Application of the principles for interpretive research in the study**

<b>Principle</b>	<b>How the principle is applied in the study</b>
The fundamental principle of the hermeneutics circle	The study’s aim is to understand the students’ views towards the DD in Swaziland. It must be understood holistically (the big picture view, for example, as per the root definitions and rich picture in Chapter 6), but also from the perspectives of the individual parts (interview questions and individual responses from participants) that contribute to it.

<b>Principle</b>	<b>How the principle is applied in the study</b>
The principle of contextualisation	The DD situation in Swaziland must be understood in the historical and cultural context of Swaziland. Culture may have an influence on how people view and use technological advancements. The researcher must be culturally aware, but not be biased as per his own cultural views.
The principle of interaction between the researchers and the subjects	The data gathering method in this study is interviews. Interviews must be viewed as conversations and participants allowed to give open and honest views, without judgement. The interview process and participants are discussed later in this chapter.
The principle of abstraction and generalisation	Logical reasoning must be applied to analyse gathered data so as to aid understanding of the students' perspectives regarding the DD. SSM is applied to structure interviews and to aid presentation of results. SSM is useful to give a structured view of complex social phenomena. Data analysis is discussed in Chapter 5. Findings are presented in Chapter 6.
The principle of dialogical reasoning	No data can be disregarded. Gathered data are analysed, evaluated, examined and presented using a combination of grounded theory (open coding, following the eight steps for coding contextual data, and categorisation of codes) as well as SSM techniques.
The principle of multiple interpretations	The participants' worldviews towards the DD may be diverse, and may also not be the same as that of the researcher. Every individual must be given an opportunity to voice their own interpretation of the problem. This correlates with the aim of the study, i.e. to understand the perspectives of the students in Swaziland towards the DD.
The principle of suspicion	Suspicion must be applied throughout the study to ensure data analysis integrity and consistency. Data analysis steps must be applied appropriately and correctly. SSM is applied, as a systems approach, to guide and structure the gathering and analysis of data, and to ensure that presentation of results is transparent and consistent in the study.

## **4.6 Research plan**

The research plan is discussed next in terms of participants, data collection and analysis, and ethical considerations that are applicable to this study.

### **4.6.1 Participants**

It is imperative that a researcher identifies and chooses suitable participants (Creswell, 2002:144). The research aim guides the selection of participants (Sargeant, 2012). Enough participants must partake in a study to ensure valid results (Bowen, 2008:140). In interpretive studies enough

participants have been interviewed when data saturation occurs (Sargeant, 2012). Data saturation means that no new codes/themes emerge during data analysis (Seale, 1999:470).

Students of the University of Swaziland's Mbabane campus participated in this study. This university was chosen because it is currently the only institute of higher learning recognised by the South African Qualifications Association (SAQA). Participants were randomly chosen from all departments of the faculty; none of the departments' students were excluded. Males and females participated equally. Participation was voluntary. Participants were assured of anonymity. All participants gave their consent to be interviewed; signed consent forms are included in the data repository.

#### **4.6.2 The data collection method**

The most important aim of interpretive interviews is to collect rich data to reflect upon so as to reach meaningful conclusions. The data collection method is a process whereby the researcher collects or gathers data that are required to answer the problem of the research (Patton, 1990:66). According to Merriam (1998:55) it is important to choose appropriate data collection methods that support the research aims; inaccurate/inappropriate data collection will lead to false results (Merriam, 1998:50).

Data were gathered by means of interviews in this study. During an interview the interviewer asks open-ended and/or close-ended questions, and records the information obtained from participants (Danida, 1999:56). Open-ended questions aim to elicit complete (meaningful) answers from the participant; they often begin with words/phrases such as: *who...*; *how...*; *why...*; or *tell me about...*; whereas close-ended questions typically limit the participant to a simple "yes" or "no" answer (Farrell, 2016). A researcher can use structured and/or unstructured interviews to gather information. Structured interviews entail properly formulated questions to guide the interview process (Danida, 1999:57). In unstructured interviews the interviewer focuses on the end-goal, but does not have a set of pre-defined questions; the interviewer's aim is to achieve an in-depth understanding of a participant's view (Cohen & Crabtree, 2006:1).

Development of the interview questions were guided by SSM's CATWOE categories. Structured interviews with open-ended questions were applied in this study. However, where participants wanted to give more information than only what was asked of them, they were allowed to do so. The interview guide included a number of questions to obtain demographic information from the participants (that is, SSM customers), and interview questions. Table 4-2 shows the questions, each coupled with a motivation for and a reference to the representative SSM category.

**Table 4-2: Structure of the interview questions**

<b>Part 1: Questions to obtain demographic information</b>
What is your academic year of study at the University?
How old are you?
What is your gender? (Options: Male/Female/Prefer to not say)
From which region are you?

<b>Part 2: Interview questions</b>	
<b>Question</b>	<b>The motivation for asking the question</b>
1. In your own words, what do you understand by the digital divide?	<ul style="list-style-type: none"> <li>• To discern and confirm the students' understanding of the DD.</li> <li>• SSM: To discern the student's worldview in terms of the DD's existence.</li> </ul>
2. How and where do you have access to the internet?	<ul style="list-style-type: none"> <li>• To discern the student's means of access on and off campus.</li> <li>• To gain an understanding of the student's internet access difficulties. For example, mobile data is expensive and hence may not be as available to students whilst on-campus while Wi-Fi may be freely available to students.</li> <li>• SSM: To learn about the student's environment (and possible constraints) in terms of internet access that impacts usage.</li> </ul>
3. What do you use the internet for?	<ul style="list-style-type: none"> <li>• To understand the student's motivation for using the internet.</li> <li>• SSM: To discern the student's worldview in terms of usefulness/ uses of the internet.</li> </ul>
4. What do you use a computer for?	<ul style="list-style-type: none"> <li>• To understand the student's motivation for using a computer.</li> <li>• SSM: To know the student's worldview in terms of usefulness/ uses of a computer.</li> </ul>
5. What challenges do you have to deal with when using the internet?	<ul style="list-style-type: none"> <li>• To discern the student's challenges and whether the student possesses basic skills to use the internet.</li> <li>• SSM: To learn about the student's environment (and possible constraints).</li> </ul>
6. What challenges do you experience when using a computer?	<ul style="list-style-type: none"> <li>• To discern the student's challenges when using a computer.</li> <li>• SSM: To learn about the student's environment (and possible constraints).</li> </ul>

<b>Part 2: Interview questions</b>	
<b>Question</b>	<b>The motivation for asking the question</b>
7. How does the fact that English is the dominant language on the internet influence you?	<ul style="list-style-type: none"> <li>• To discern whether students have a language barrier towards English, as the dominant language on the internet, and whether it hinders them.</li> <li>• SSM: To learn about the student's environment (and possible constraints).</li> </ul>
8. How do you feel does the cost and speed of the internet in the country affect you?	<ul style="list-style-type: none"> <li>• To discern the student's perceptions regarding service delivery and affordability of the internet service provider (ISP) and mobile service providers in Swaziland.</li> <li>• SSM: To determine the effects of actions of external parties, ISPs (as actors/owners that contribute to the DD).</li> </ul>
9. Tell me about the computer facilities you had when you were in primary and secondary school?	<ul style="list-style-type: none"> <li>• To discern whether the student had access to computer facilities at school; it includes internet connectivity.</li> <li>• SSM: To understand the transformation that is required that may bring about improvement in terms of the DD.</li> </ul>
10. Tell me about the computer facilities you have at home?	<ul style="list-style-type: none"> <li>• To discern whether students have access to computer facilities at home including internet connectivity.</li> <li>• SSM: To understand the transformation that is required that may bring about improvement in terms of the DD.</li> </ul>
11. What type of computer and/or internet training do/did you receive at the university?	<ul style="list-style-type: none"> <li>• To discern the type and level of training the student receives/received to use computers/internet.</li> <li>• SSM: To understand the transformation that is required that may bring about improvement in terms of the DD, and the role that the university (as an actor) can play in this regard.</li> </ul>
12. What type of device do you prefer when using the internet? Why?	<ul style="list-style-type: none"> <li>• To discern the student's device preference (if any) and/or availability of devices.</li> <li>• SSM: To discern the student's worldview in terms of usable and/or superior devices/device types.</li> </ul>
13. What do you think is the effect of having only one internet service provider in the country?	<ul style="list-style-type: none"> <li>• To discern the student's perception towards the internet service provider and the monopolistic role that it plays.</li> <li>• SSM: To understand the transformation that is required that may bring about improvement in terms of the DD. The ISP is an actor.</li> </ul>
14. What do you think can/should be done to lessen the digital divide in our communities?	<ul style="list-style-type: none"> <li>• To discern the student's view on how the DD can be bridged.</li> <li>• SSM: To understand the transformation that is required that may bring about improvement in terms of the DD. To identify owners/actors.</li> </ul>

### 4.6.3 Analysis of collected data

Thorne (2000:68) observes that data analysis is the most complicated phase of the qualitative research process; however, it is necessary for bringing meaning and structure to a mass of gathered data. Miles *et al.* (1984:200) agree that it facilitates organisation of collected data in order for a researcher to make sense of it. For example, to understand: *What are the data reflecting? What are the data not reflecting? What is missing?* So, qualitative data must be analysed systematically using a transparent approach such as using the following eight steps: prepare the data; define the unit of analysis; develop code and scheme categories; test the code and scheme categories; code the data; assess the assigned codes' consistency; draw conclusions from coded data; and report on the findings and method (Zhang & Wildemuth, 2016:3). These are discussed next in the context of this research study.

First, data preparations entail transformation of recorded (voice) data into written text, i.e. transcribe all voice recordings accurately (Patton, 1990). The researcher transcribed all voice notes; they form part of the data repository.

Second, the unit of analysis refers to the major entity being analysed, for example, individuals (De Wever *et al.*, 2006). Swaziland students' perceptions with regard to the DD were investigated in this study; the unit is thus the individual, and sentences were coded by allocating a descriptive code to it. The code "summarised" its meaning.

Third, Zhang and Wildemuth (2016:3) stipulate that codes and categories must be developed (and defined) so that they can be applied to the text. Code creation can involve one of two processes, i.e. emergent or pre-set; it is advised that codes are initially allocated from pre-set codes (Saldaña, 2015:7). Emergent coding then occurs during reading and analysing the data collected when the researcher notices new (emerging) codes from the data. These could be actions, ideas, relationships, meanings and concepts in the data (Saldaña, 2015:8). In this study the researcher applied open coding, and then categorised the codes accordingly; categories were allocated to the SSM CATWOE categories, which were regarded as the themes.

Fourth, testing of coding and categories must be done to ensure code/category consistency; this ensures that codes/categories are consistently applied to pieces of text that is captured by the exact meaning/intent of the code/category.

Fifth, text must be coded. Coding is a way to arrange and organise information (Saldaña, 2015:5). Gibbs (2008) agrees that a researcher must regard coding as a way to organise collected data,

similar to a filing system. It enables a researcher to synthesise and summarise data. Coding can be done in various ways, but it usually entails allocating a word, symbol, or number to a piece of text (that is, a phrase/paragraph) (Gale *et al.*, 2013:5). Glaser *et al.* (1968) also explain that inductive coding (as was applied in this study) entails condensing large amounts of raw data by associating relevant (short) codes with (long) text phrases/paragraphs so as to establish clear links between the aims of the research and (summarised) findings. The end-goal is to derive a theory based on the responses of the participants. The theoretical property of each category is understood through a systematic comparison done for each and every piece of text that has been assigned to a specific category; one code/category can be assigned to more than one unit of text. Coding of data is discussed in detail in Chapter 5.

Sixth, consistency of codes assigned to text must be assessed; Zhang and Wildemuth (2016:5) allude that at this stage the researcher should check that data have been coded/categorised consistently. Refer to Chapter 5 for a discussion on this.

Seventh, the researcher draws conclusions from the coded data. This stage is crucial because the researcher makes inferences and presents the conclusions that carry the understanding or meaning acquired from the analysed data (Zhang & Wildemuth, 2016:5). The findings of this study is summarised in Chapter 5; analysed data are presented as root definitions and a rich picture in Chapter 6.

Last (eighth) the researcher reports on findings. Zhang and Wildemuth (2016:6) state that a good report provides the reader with enough descriptive information to understand the researcher's intended interpretation of the data. Patton (2002:503) argues that honest and trustworthy reporting is vital. Refer to Chapter 6.

#### **4.6.4 Ethical considerations**

According to Bryman and Bell (2015:2) ethical considerations are one of the most important aspects of any research study. NWU has an ethical process which was followed by the researcher. For example, participants' identities were protected and participation was entirely voluntary; and the questionnaire was approved by the relevant authority.

#### **4.7 Summary**

Research can be conducted in various ways. The objective of the study guides the approach to be used. This chapter broadly explained how paradigms differ, and motivated the chosen research paradigm. It briefly explained the methods used to collect and analyse data. It also explained how

rigor will be ensured in this study, to ensure it is trustworthy in 4.5. The next chapter discusses the steps followed to collect and analyse the data in more detail.

# CHAPTER 5: EMPIRICAL STUDY: DATA COLLECTION AND ANALYSIS

## 5.1 Introduction

The aim of this study was to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also determined what efforts can, according to these students, be made in Swaziland to help bridge the gap of this technological epidemic. This chapter presents a portion of the empirical work that was done through careful analysis of the data gathered from participants during interviews. It discusses the participants of the study, the collection of data and the steps followed to analyse the data.

## 5.2 Participants

Students were interviewed until data saturation was reached, i.e. no new codes emerged. Students were randomly selected for the interview process. All students interviewed were citizens of Swaziland; they were born and raised in Swaziland. The first year students had an age range of 18 to 20, and the final year students had an age range of 20 to 23. The students were not compared with another age group as all of the participants in the study were between ages 18 to 23. The reason for selecting a combination of first and final year students, was to determine whether there would be significant differences in their technological background, that is, whether the fact that they were exposed to campus life longer (and hence for an extended period to more freely available computer/internet facilities) would influence their perspectives of the DD. Gender did not influence the (random) selection process and interviews. However, since gender is a factor of the DD (refer to Chapter 2) it reports to point out that both genders were included in the study. A total of 20 students participated in the study—refer to Table 5-1.

**Table 5-1: Participants**

Students	Male	Female	Total
First year	5	5	10
Final year	3	7	10
Total	8	12	20

## 5.3 Data collection

All the interviews were in person (face-to-face). Participants were requested to give consent for the interviews (consent forms are included in the data repository) and were assured of anonymity. Participation was voluntary. Interviews were recorded using a combination of voice notes and written responses; all are included in the data repository.

## **5.4 Data analysis**

Qualitative data must be analysed systematically to: prepare the data; define the unit of analysis; develop codes and categories; test the codes and categories; code the data; assess the assigned codes' consistency; draw conclusions from coded data; and report on the findings and method (Zhang & Wildemuth, 2016:3). Refer to Chapter 4 for detailed discussion on these items. They are discussed next in terms of application to achieve the empirical objective of this study.

### **5.4.1 Step 1: Preparing data**

Data preparation entails transcribing voice notes. The researcher struggled to directly translate some of the students' (participants') responses as their (the participants') native language is not English. For the purpose of this study the interviews were conducted in English; yet, some students responded by speaking a mixture of English and siSwati. Care was taken by the researcher (his first language is siSwati and his second language is English) to meticulously translate what they said in such cases, so as to keep to the intent of what they said and meant during the interviews.

Transcribed data was analysed using Atlas.ti software. The data repository for this study can be found at:

[https://drive.google.com/drive/folders/1WoC263c7AZ2GKE4AeZLPg\\_De1VjcBP1e](https://drive.google.com/drive/folders/1WoC263c7AZ2GKE4AeZLPg_De1VjcBP1e).

Each participant was assigned an identification number, in the order which they were interviewed. The numbers range from 1 to 20; for example, participant 1 is referred to as P1 and so on, as shown in Figure 5-1.

	#	^	Name
	1		P1
	2		P2
	3		P3
	4		P4
	5		P5
	6		P6
	7		P7
	8		P8
	9		P9
	10		P10
	11		P11
	12		P12
	13		P13
	14		P14
	15		P15
	16		P16
	17		P17
	18		P18
	19		P19
	20		P20
<b>Result: 20 of 20 Document(s)</b>			

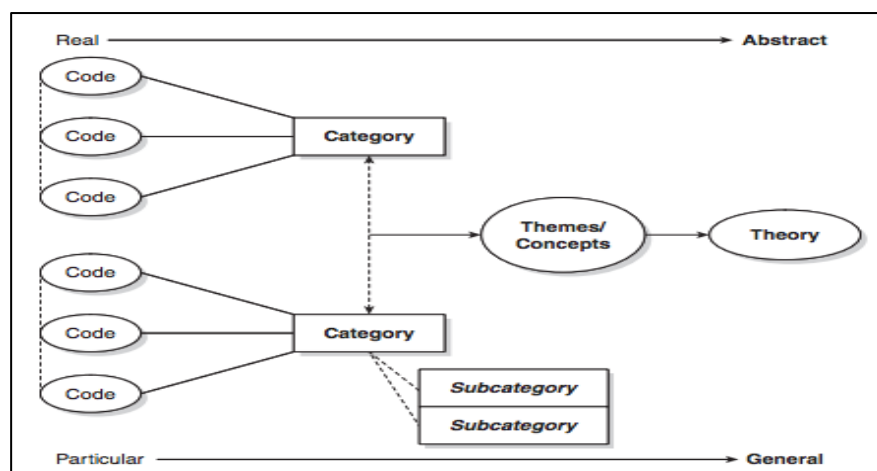
**Figure 5-1: ID of participants from Atlast.ti**

#### 5.4.2 Step 2: Define the unit of analysis

Questions were asked to the participants in the study. These questions were divided into different parts (Part 1 and part 2) as clearly shown in 4.6.2. Both of these sections are represented as units. Then the questions that follow within the questions are subunits.

#### 5.4.3 Step 3: Develop codes and categories/themes

In this step codes and categories are developed; categories are formed by grouping codes, based on their relationships. From categories emerge themes; which, in the end, results in the developed theory. The process is illustrated in **Figure 5-2**.



**Figure 5-2: Codes, categories and themes (Saldaña, 2015:12)**

#### 5.4.4 Step 4: Test codes and categories/themes

Codes and categories must be tested to ensure that they are consistently applied to analysed text. The researcher randomly selected question 9 (part 2) of the questionnaire, and participants P2, P5, and P7 for the unit testing step. Refer also to Table 4-2 in Chapter 4 for the complete set of interview questions. The first column in Table 5-2 represents the participants' responses to question 9; the second column contains the codes that are assigned to their respective responses.

**Table 5-2: The application of unit testing**

Extraction of responses to question 9: "Tell me about the computer facilities you had when you were in primary and secondary school?"	Assigned codes
P5: " <u>In primary school there was just one computer, and no internet</u> [a]. <u>In secondary school they were computers and internet</u> [b]..."	[a]Primary: Incomplete Facilities [b]Secondary: Complete Facilities
P2: " <u>In primary school, they were no computers</u> [c], <u>when it came to secondary school we had computers but there was no internet</u> [d]."	[c]Primary: No Facilities [d]Secondary: Incomplete Facilities
P7: " <u>Primary they were no computers and no internet</u> [c], <u>secondary we had a computer lab and had internet</u> [b]..."	[c]Primary: No Facilities [b]Secondary: Complete Facilities

These three participants' responses were coded and then re-examined to confirm that the codes were consistently applied to reflect the intent/meaning of the text, and that the codes correlated well with the aim of the question. Question 9 aimed at determining the availability of access and perceptions regarding the type/appropriateness of computer facilities (if available), the students had access to in primary and secondary school; computer facilities also include internet access. So, for question 9, the participants' responses indicated whether they had: complete, incomplete or no computer facilities in primary and secondary school. As an example, P5 was assigned codes **Primary: Incomplete Facilities**; and **Secondary: Complete Facilities**. P2 was assigned codes **Primary: No Facilities**; and **Secondary: Incomplete Facilities**; and P7 was assigned codes **Primary: No Facilities**; and **Secondary: Complete Facilities**.

For example, these codes mean that: if a participant was assigned the code **Primary: No Facilities**, he/she did *not* have access to computer and internet facilities in primary school. If a participant was assigned the code **Primary: Incomplete Facilities**, he/she had access to basic computer facilities, but no internet, at primary school. If a participant was assigned the code **Secondary: Incomplete Facilities**, it means that he/she had access to basic computer facilities, but no internet,

at secondary school. If a participant was assigned the code **Secondary: Complete Facilities**, he/she had access to both a computer and the internet at secondary school. By defining the intent/meaning of codes properly, consistent assignment thereof was possible.

After coding, codes were grouped into categories. Categories were then assigned to themes, as per CATWOE elements (refer to the detailed discussion on SSM in Chapter 3). For example, in this case, the category is ‘school facilities’; this category was assigned to the theme ‘transformation’; where no/incomplete facilities were identified, it indicates that transformation (i.e. improvement in facilities at schools) is required to lessen the DD; literature indicated that exposure to computer/internet facilities at school level lessen a DD (refer to Chapter 2 for factors causing a DD). So, the transformation theme describes the transformation needed at, for example, schools to improve the DD. It is illustrated in Table 5-3. Refer also to Chapter 6 for a detailed discussion on the transformation required to lessen the DD in Swaziland, according to the participants interviewed.

**Table 5-3: Example of transformation required to lessen the DD**

Input	Transformation	Output
Primary: No Facilities or Primary: Incomplete Facilities	—————▶	Primary: Complete Facilities
Secondary: No Facilities or Secondary: Incomplete Facilities	—————▶	Secondary: Complete Facilities

**5.4.5 Step 5: Code the data**

In this step, all the participants' responses were coded. Responses were analysed and consistently allocated to relevant codes. Refer to Table 5-4 for an example—it shows coding of responses to question 6, that is, “What challenges do you experience when using a computer?”

**Table 5-4: Summary of responses to question 6**

Codes	Participants (P)																				Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Not Lacking Computer Skills	0	1	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	12
Lacking Computer Skills	1	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	6
Computer Access Difficulties	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20

#### 5.4.6 Step 6: Assess consistency of codes, categories and themes

Code creation is driven by the objective of the research and, hence, the interview questions that should elicit responses to enable achievement of the research aim. In the end, clear presentation of data analysed is necessary to draw relevant conclusions. In this study, fourteen questions were asked to determine the students' perspectives with regard to the DD—refer to Section 4.6.2 in Chapter 4 for the complete set of interview questions coupled with the motivation for each questions. These questions all relate to factors causing and/or impact of a DD on people—refer to Chapter 2 for the literature review on the DD that details factors, causes and impacts of a DD. So, in this study, conclusions drawn must accurately portray the stories told by the students (i.e. the students' perceptions) with regard to the DD in Swaziland. In this step, it is important that all codes are consistently allocated. Responses must be considered holistically for as far as they are related to the question asked. Code consistency was assured as follows: Codes were created by analysing responses of the first participant (P1). These codes were then applied to the responses of the second participant (P2), and so on. As the process continued, new codes emerged and were applied consistently to responses. The process was repeated until no new codes emerged.

As an example, a DD is caused by, for instance, lack of access to proper internet facilities. So, participants were asked in Question 2: “How and where do you have access to the internet?” The aim here was to reveal whether the students have access to the internet, if so, how and where as, for example, mobile data is quite expensive in Swaziland and hence may not be readily available to students, while on-campus Wi-Fi may be freely available to students. A total of three codes emerged from the responses to this question, i.e. **LAN access**; **Wi-Fi access**; and/or (mobile) **Data Access**; they all refer to types of access and were therefore categorised as ‘access’. In this instance, after interviewing the fourth participant (P4), no new codes emerged. Table 5-5 shows an extraction of coding of responses to Question 2. Note that a participant can have access to more than one type of access, e.g. Wi-Fi and/or LAN access (on campus) and/or mobile data (at home).

**Table 5-5: Extracted responses coded for step 7: draw conclusion from coded data**

Responses to question 2: “How and where do you have access to the internet?”	Codes of category: Access
P1: I have internet here at school and at home. <u>When I’m at school (University) I use the school’s Wi-Fi [b], when I’m at home I use (mobile) data [c].</u>	[b]Wi-Fi Access [c]Data Access
P4: <u>I have internet access here at the University through the schools Wi-Fi [b] and computer lab[a].</u>	[b]Wi-Fi Access [a]LAN Access

At data saturation, a total of 37 codes emerged. Table 5-6 summarises the codes and categories—codes and categories were explanatory enough, so the researcher did not define them in more detail. Table 5-6 also indicates the number of times a code was allocated.

**Table 5-6: Summary of codes and categories**

Category	Codes	#allocations
Service delivery (of ISP and mobile)	Swazi Mobile: Satisfactory Service Delivery	7
	Swazi Mobile: Unsatisfactory Service Delivery	11
	MTN: Unsatisfactory Service Delivery	20
	SPTC: Satisfactory Service Delivery	1
	SPTC: Unsatisfactory Service Delivery	19
Service delivery situation of owner	Government	11
Home facilities	Home: Facilities Unavailable	11
	Home: Facilities Partly Available	7
	Home: Facilities Fully Available	2
School facilities	Primary: No Facilities	13
	Primary: Incomplete Facilities	7
	Secondary: Incomplete Facilities	7
	Secondary: Complete Facilities	13
Internet use	Internet: Academic Use	20
	Internet: Entertainment Use	20
Computer use	Computer: Academic Use	19
	Computer: Entertainment Use	16
Device preference	Device preference: Desktop Computer	4
	Device preference: Laptop	6
	Device preference: Mobile Phone	11
The digital divide	Promoting ICT Learning	19
	Build ICT Infrastructure	7
	Technology Barrier	1
	Digital Divide	20
Internet access challenges	Internet Access Difficulties	20
	Lacking Internet Skills	5

Category	Codes	#allocations
Computer access challenges	Not Lacking Computer Skills	12
	Lacking Computer Skills	6
	Computer Access Difficulties	2
Language	Language Barrier	5
	No Language Barrier	15
Quality of service (of ISPs in general)	Low Quality Service	20
	High Costs	14
Computer training	Basic Computer Training	16
	Advanced Computer training	4
Types of access	LAN Access	7
	Wi-Fi Access	17
	Data Access	8

The details in Table 5-6 reflects the ‘stories’ of the students, e.g. that they use computers and the internet equally for academic and entertainment purposes; very few students (only five) find English a barrier and hence consider it as a possible factor that causes/widens the DD in Swaziland; and the bulk of the students are unsatisfied with service delivery of internet service providers (ISPs)—refer to the categories ‘service delivery’ as well as ‘quality of service’. The relationship between the codes/categories and themes is determined by the type of theme the codes and categories fall under. As an example, students’ challenges, such as internet access difficulties, lacking internet skills, and internet access speed, form part of the theme environment (constraints), which entails environmental constraints as per the SSM framework. The themes are discussed next.

**5.4.7 Step 7: Results of data analysis**

This section discusses the outcome of the data analysis phase. Codes/categories were allocated to themes, reflected upon as per the CATWOE elements, to identify the customers, owners/actors, required transformation, worldview and environmental constraints according to the participants. This section discusses the analysed data in the context of themes; themes did not emerge from the data, but were derived from the SSM categories that were also applied to guide the development of the interview questions. The researcher reflected on the outcome of the analysed data within the boundaries of CATWOE; so, he applied them as overarching themes as follows: theme 1 represents

the customers; theme 2 represents owners/actors; theme 3 represents the (required) transformation, according to the participants (as the customers); theme 4 represents the students' worldviews with regard to the DD in Swaziland; and theme 5 represents the environment (that poses constraints, according to the students).

#### **5.4.7.1 Theme: customers**

The first theme was not derived from participants' responses; rather, the first theme *entailed* the participants. The researcher aimed to understand the perspectives of the students in Swaziland; therefore, they were regarded as the customers in the context of this study. Refer to Chapter 5 for a detailed discussion of the students that participated.

During analysis of the data, no student/customer code was therefore formulated. The data did not allow for this because it only focused on students from the beginning. False formulation of the code is thus irrelevant because there was no need to compare it with another element in the study. Due to validation and trustworthiness of the results and the direction of the study, the SSM framework in this theme still maintains its intent of use.

As indicated in Chapter 5, a combination of first and final year students were included in the study to determine whether the fact that final year students were exposed to campus life longer (and hence for an extended period to more freely available computer/internet facilities) would influence their perspectives of the DD.

#### **5.4.7.2 Theme: owners/actors**

This theme encapsulates the codes as per Table 5-7 and Table 5-8. The codes were created based on the responses received when asking Question 8, such as "How do you feel does the cost and speed of the internet in the country affects you?" and Question 14, that is, "What do you think can/should be done to lessen the digital divide in our communities?" Responses to Question 8 are illustrated in Table 5-7; responses to Question 14 are illustrated in Table 5-8. *With these questions, the users, who are the students, help identify what they feel can make a difference with regard to the DD in Swaziland, by service providers and the government. Service providers who are actors (providing service) according to the rules made by the owner (that is, the government).*

**Table 5-7: Service delivery situation of actors**

Codes	Participants (P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Swazi Mobile: Satisfactory Service Delivery	0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	1	0	0	0	0	7
Swazi Mobile: Unsatisfactory Service Delivery	1	1	0	0	1	1	0	0	0	0	1	0	1	0	1	0	1	1	1	1	11
MTN: Unsatisfactory Service Delivery	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
SPTC: Satisfactory Service Delivery	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
SPTC: Unsatisfactory Service Delivery	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
<b>Total</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>69</b>

The code **Swazi Mobile: Satisfactory Service Delivery** was assigned to seven (7) participants; they were satisfied with the cost and speed of Swazi Mobile. A total number of 11 participants were assigned to the **Swazi Mobile: Unsatisfactory Service Delivery** code; this reflects their dissatisfaction with the cost and/or speed of services of Swazi Mobile. All the participants (20) were unsatisfied with MTN (refer to code **MTN: Unsatisfactory Service Delivery** assigned to all). Only one (1) participant was satisfied with the service from SPTC; refer to code **SPTC: Satisfactory Service Delivery**. The bulk (19 participants) were not satisfied with SPTC as a service provider.

It is important to note that some of the students have/had exposure to both mobile service providers (i.e. MTN and Swazi Mobile) *and* the sole ISP (that is, SPTC); they were thus able to comment on all of them in terms of service delivery. They have exposure to these providers depending on where

they access the service; e.g. most participants have access to SPTC at the university (they provide LAN services to the university and in some instances to homes and schools). The mobile networks (MTN and Swazi Mobile) and ISP (SPTC) are partly available in rural areas. As such, even though some participants felt more satisfied with one provider over another, the overall results showed that, in general, they more were *unhappy* with the overall services that they received from all. These refer to the actors. They are, in SSM terms, those that do activities; in this study they deliver services. Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-8: Service delivery situation of owner**

Codes	Participants (P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Government	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	1	1	0	0	1	11
Total	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	1	1	0	0	1	11

The code **Government** was assigned to 11 participants. They felt that the government can do more for the community to lessen/bridge the DD. So, the government was identified as a contributor towards the DD; government should take responsibility to improve the DD for communities. The government owns the problem; they make legislation and decisions that impact upon service delivery. The above actors act according to the rules made by government; for example, the mobile providers (MTN and Swazi Mobile) *must* use SPTC as the *sole* provider of internet in Swaziland. Next are examples of specific responses extracted that portray the general feelings of the students.

**5.4.7.3 Theme: transformation**

This theme encapsulates the codes as per Table 5-9 and Table 5-10. The codes were created based on the responses received when asking Question 12, i.e. “Tell us about the computer facilities you had at Home?” and Question 9, i.e. “Tell us about the computer facilities you had back in primary and secondary school”? Responses to Question 12 are illustrated in Table 5-9; responses to Question 9 are showed in Table 5-10. This theme entails the availability of computer (and internet) facilities at home and at school. *Early and ongoing access to such facilities lessen a DD (refer to Chapter 2); so, transformation is needed where these facilities are lacking.*

**Table 5-9: Computer facilities availability at home**

Codes	Participants (P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Home: Facilities Unavailable	0	1	0	1	0	1	0	0	0	1	1	1	0	0	0	1	1	1	1	1	11
Home: Facilities Partly Available	1	0	0	0	1	0	1	1	0	0	0	0	1	1	1	0	0	0	0	0	7
Home: Facilities Fully Available	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2

The code **Home: Facilities Unavailable** was assigned to 11 participants, which reflects that they do not have a computer or access to the internet at home. Seven (7) participants were assigned the code **Home: Facilities Partly Available**, this showed that they have access to a computer at home, but that they do not have access to the internet. Only Two (2) participants indicated that they have a computer *and* internet access at home; refer to the code **Home: Facilities Fully Available**. So, most students have/had no computers or/and the internet available at home. Next are examples of specific responses extracted that portray the general feelings of the students.

**Question 12: Tell us about the computer facilities you had at Home?**

P16: “We don't have a computer or the internet at home.”

P14: “We have a computer but these no internet.”

P3: “Desktop computer with limited internet, but the internet is not always available.”

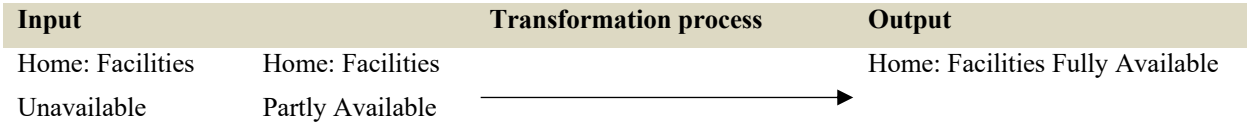
**Table 5-10: Computer facilities availability in primary and secondary school**

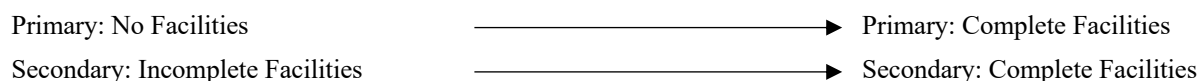
Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Primary: No Facilities	0	1	1	0	0	0	1	0	0	1	1	1	1	1	1	0	1	1	1	1	13
Primary: Incomplete Facilities	1	0	0	1	1	1	0	1	1	0	0	0	0	0	0	1	0	0	0	0	7
Secondary: Incomplete Facilities	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	1	1	1	0	0	7
Secondary: Complete Facilities	1	0	1	1	1	0	1	1	1	1	0	1	1	1	0	0	0	0	1	1	13
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	40

Table 5-10, 13 participants were assigned the code **Primary: No Facilities**, they did not have a computer and/or access to internet in primary school. **The Primary: Incomplete Facilities** code was assigned to seven (7) participants, which had computers but no internet connection in primary school. The code **Secondary: Complete Facilities** was assigned to 13 participants, because they had computers and an internet connection in secondary school. Seven (7) participants were assigned the code **Secondary: Incomplete Facilities** because they had computers with no internet access in secondary school. It is noteworthy that *all* the participants had access to *some* facilities in *secondary* school even though most participants did not have access to facilities during their *primary* school education. Next are examples of specific responses extracted that portray the general feelings of the students.

The transformation required is demonstrated in Table 5-11. It demonstrates that a transformation is needed to move towards having complete facilities in all schools and at home.

**Table 5-11: Transformations required in terms of facilities**





#### 5.4.7.4 Theme: worldview

This theme encapsulates the codes per Table 5-12, Table 5-13 and Table 5-14. The codes were created based on the responses received for Question 3, i.e. “What do you use the internet for?” It also reflects on Question 4, that is, “What do you use a computer for?” and question 11, such as, “What type of device do you prefer when using the internet? Why?” A code (**Digital Divide**) was also formulated based on the responses received when asking Question 1, i.e. “In your own words, what do you understand by the digital divide?” *This question aimed at determining whether the students have an understanding of a DD, and believe that it exists. The code was assigned when a student was able to provide a definition and confirmed existence of the DD.* Responses to Question 3 and 4 are illustrated in Table 5-12; responses to Question 11 are illustrated in Table 5-13; responses to Question 1 and 14 are illustrated Table 5-14. *With these questions, the worldview, that the students feel can make a difference with regard to the DD in Swaziland, has been identified. These are their perceptions illustrated below.*

**Table 5-12: Participants use of the computer and the internet**

Codes	Participants (P)																				Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Internet: Academic Use	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Internet: Entertain- ment Use	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Computer: Academic Use	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	19
Computer: Entertain- ment Use	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	16
<b>Total</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>40</b>

In Table 5-12 codes **Internet: Academic Use** and **Internet: Entertainment Use** were assigned to all 20 participants. So, all the participants indicated that they use the internet for both academic and entertainment purposes. For example, participants indicated that they use computers/internet to watch movies, doing research, typing assignments etc. Next are examples of specific responses. Only 19 participants were assigned the code **Computer: Academic Use**. Furthermore 16 participants were assigned the code **Computer: Entertainment Use**.

It is important to note that only one student claimed *not* to use the computer for academic reasons. S/he says that s/he only listens to music and watches movies with a computer. Also, three (3) participants said they do not use a computer for entertainment reasons; i.e. where P10 claims s/he only uses it to type assignments.

**Table 5-13: Ways to improve the DD and acknowledgment of its existence**

Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Promoting ICT Learning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	19
Build ICT Infrastructure	0	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	7
Technology Barrier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
<i>Digital Divide</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Total	2	3	3	3	3	2	2	2	2	2	2	3	2	2	2	2	2	2	2	3	47

Table 5-13 shows that (19) participants were assigned the code **Promoting ICT Learning** because of the perception they have on the importance of having computer and internet learning. Seven (7) participants were assigned the code **Build ICT Infrastructure** because they felt the construction of computer and internet infrastructures is needed. Only one (1) participant out of 20 was assigned the code **Technology Barrier** because the participant felt technology is not of great use.

Lastly, as indicated above, a code **Digital Divide** was formulated to illustrate that the students were all able to define a DD *prior* to the onset of the interview. It is important to note that all 20 participants defined the DD; they were thus able to formulate their own understanding thereof. They each had unique, but interesting views on what the DD means to them. Some participants felt that the government and ICT Ministry should contribute towards building ICT infrastructures such as in libraries and schools, especially in rural areas. It is also noteworthy that all 19 regard

technology to be important. Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-14: Device preference of participants**

Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Device preference: Desktop Computer	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	4
Device preference: Laptop	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	1	1	0	6
Device preference: Mobile Phone	0	1	1	0	1	1	1	1	1	0	0	0	1	0	1	1	0	0	0	1	11
Total	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	21

In Table 5-14 only four (4) participants were assigned the code **Device preference: Desktop Computer**, as they prefer using a desktop computer. The code **Device preference: Laptop** was assigned to six (6) participants; this reflects that their device of choice is a laptop. A total of 11 participants were assigned the code **Device preference: Mobile Phone** because their device of choice is a mobile phone.

Only one (1) participant indicated that s/he has more than one device preference; s/he prefers to work on a laptop *or* mobile phone. Most of the participants were happy to use mobile phones/laptops over desktop computers, because these devices offered portability, for example, with mobile phones the internet can be reached from anywhere. Desktop computers were preferred the least. Next are examples of specific responses extracted that portray the general feelings of the students.

**5.4.7.5 Theme: environment (constraint)**

This theme encapsulates the codes as per Table 5-15, Table 5-16, Table 5-17, Table 5-18 as shown in Table 5-19 and Table 5-20. The codes were created based on the responses received when asking a number of Questions: It includes Question 5, such as “What challenges do you get when using the internet?” and Question 6, which was “What challenges do you experience when using the

computer?” It also encapsulates Question 7, which was “How does the fact that English is the dominant language on the internet affect you using it?” Question 10, i.e. “What form of computer and internet training do you get at the university?” is included here. And Question 13, i.e. “What is the effect of having one internet service provider in the country?” as well as Question 2, i.e. “How and where do you have internet access” Responses to Question 5 are illustrated in

Table 5-15; responses to Question 6 are illustrated in Table 5-16, responses to Question 7 are illustrated in Table 5-17; responses to Question 13 are illustrated in Table 5-18; responses to Question 10 are illustrated in Table 5-19; and responses to Question 2 are illustrated in Table 5-20. *With these questions, the environmental constrains that are affecting the students with regard to the DD in Swaziland, have been identified. These are their perceptions illustrated below.*

**Table 5-15: Challenges: internet**

Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Internet Access Difficulties	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Lacking Internet Skills	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	5
Total	2	2	1	2	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	24

Table 5-15 shows that (19) participants were assigned the code **Internet Access Difficulties**; it indicates that they have obstacles when accessing the internet, for various reasons. The code **Lacking Internet Skills** was assigned to five (5) participants; they struggle to use the internet adequately, that is skills and difficulties portray a different meaning in the context explained above.

It is important to note that most of the participants indicated that they have difficulties to access the internet; e.g., the university restricts internet usage to 3 gigabytes per month per student while others indicated they were unhappy as the internet speed is regarded as too slow. Few participants felt that they lack internet skills and therefore struggle, for example, to find specific websites. Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-16: Challenges: computers**

Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Not Lacking Computer Skills	0	1	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	12
Lacking Computer Skills	1	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	6
Computer Access Difficulties	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20

Table 5-16 shows that 12 participants were assigned the code **Not Lacking Computer Skills**; this reflects that they perceive themselves to be computer literate. Six (6) participants were assigned the code **Lacking Computer Skills**; this reflects that they feel that they have limited knowledge regarding use of computers. Only two (2) participants were assigned the code **Computer Access Difficulties**. It represents participants that find it difficult to use a computer due to, for example, technical issues and/or workspace, and not because they cannot use one. So, lack of skills and access difficulties have different meanings in the context explained above.

Most of the participants perceive themselves to be computer literate; they claimed to have no challenges with regard to using computers. Some participants felt that they lack specific skills when to use specific applications or programmes. Few participants felt they experience difficulties, for example, computers provided by the university would “crash” (technical difficulties). Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-17: English as a language barrier**

Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Language Barrier	1	1	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	5
No Language Barrier	0	0	1	1	0	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	15
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20

Table 5-17 shows that five (5) participants were assigned the code **Language Barrier**; this represents participants that feel that English is a problem to them when they are using the internet. About 15 participants were assigned the **No Language Barrier** code; this reflects that they felt comfortable and had no problems with English being dominant on the internet. Most students felt they do not have a problem with English being dominant on the internet; they feel they understand it because they have been educated in English since preschool. A few students claimed they find it difficult to understand English; this is not their mother tongue. Overall, the students were happy with English being dominant on the internet. Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-18: Effects of having only one internet provider**

Codes	Participants (P)																				Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Low Quality Service	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
High Costs	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	0	1	0	1	14
Total	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	2	1	2	1	2	24

Table 5-18 shows that all 20 participants were assigned the code **Low Quality Service**; this represents poor quality of service is being offered by the internet service provider (ISP). About 14 participants were assigned the code **High Costs**; this code indicates that the internet is expensive. All the participants (20) feel that the ISP provides low quality service—the internet is slow and not as accessible in rural areas. The ISP has a monopoly and hence prices are too high. Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-19: Types of computer training at the university**

Codes	Participants(P)																				Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Basic Computer Training	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	1	16
Advanced Computer Training	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0	4
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20

Table 5-19 shows that sixteen participants were assigned the code **Basic Computer Training**; this indicates that they have been trained to use a computer, but not the internet. Only four (4) participants were assigned the code **Advanced Computer Training**; this indicates basic computer skills as well as training to effectively use the internet. Most participants were offered basic computer training whereby they were taught to use application software such as Microsoft Word and PowerPoint. The participants that indicated that they were taught to use internet were, for example, also able to use database and collaboration software. Next are examples of specific responses extracted that portray the general feelings of the students.

**Table 5-20: Types of internet access**

Codes	Participants(P)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
LAN Access	0	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0	1	7
Wi-Fi Access	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	17
Data Access	1	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	8
Total	2	2	2	2	2	1	1	2	1	2	2	1	1	2	1	1	1	2	2	2	32

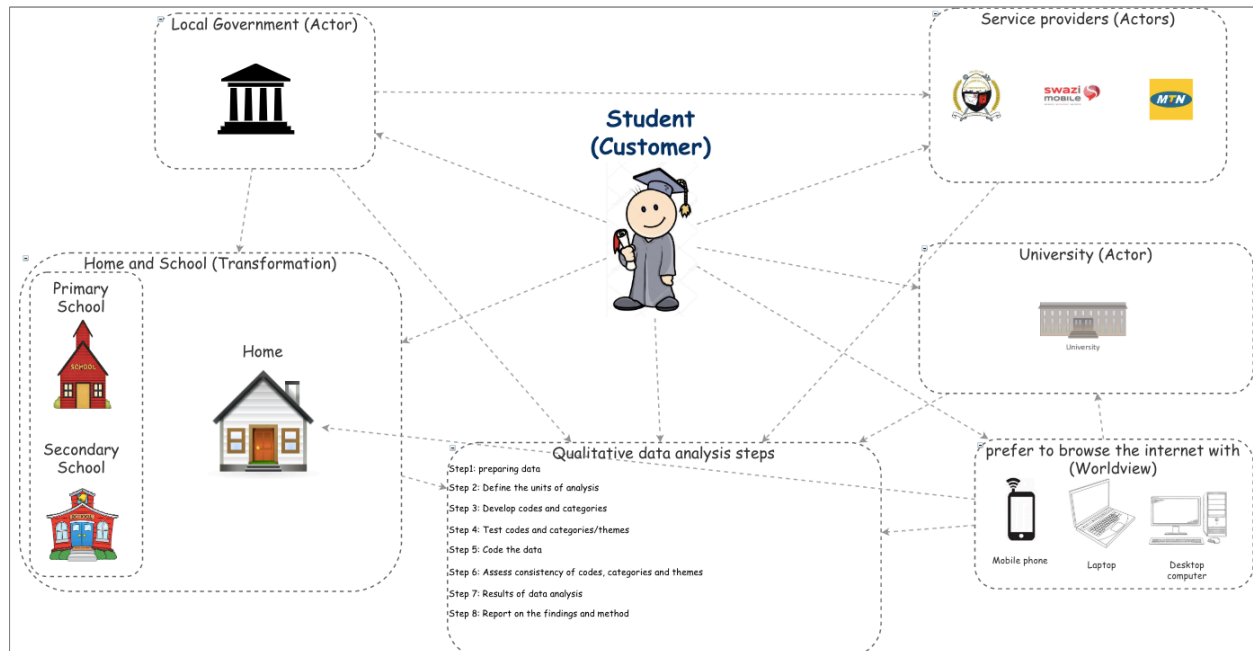
Table 5-20 depicts that seven (7) participants were assigned the code **LAN Access**; this represents the use of the university’s local area network (LAN) to access the internet. About 17 participants were assigned the code **Wi-Fi Access**; they mainly use the university’s wireless network (Wi-Fi). The code **Data Access** was assigned to eight (8) participants; they use (their own) mobile data to access the internet. Most participants access the (free) Wi-Fi when they are at the university. Some use their own data, and only when they are off campus and/or at home. Next are examples of specific responses extracted that portray the general feelings of the students.

**5.4.8 Step 8: Report on the findings and method**

In this last step, the findings of the study are reported on; the researcher must also report on the method applied, to demonstrate it was applied rigorously. For this study, the researcher depicts the outcome of the research in rich pictures (as per SSM) and using root definitions. It is discussed and presented in Chapter 6. Thereafter, the rigor of the method applied is discussed in Chapter 7.

## 5.5 Logical conceptual picture illustrating the DD

The logical conceptual picture in **Figure 5-3** represents a logical overview of the methodologies that were used in the chapter to illustrate the empirical results. This picture slowly reveals how the DD story unfolds from the results gathered from the empirical data that was collect from the interviews.



**Figure 5-3: The logical conceptual picture of the DD**

As per Table 5-3, represents the SSM methodology seen as themes; categories mentioned next to them. The Images further illustrate the categories used by the themes in the conceptual picture to give an idea of how chapter 6 will unfold. The qualitative data analysis steps reflect the qualitative techniques which guides the results of the data analysed and is interconnected with SSM towards achieving correct empirical analysis for the study.

## 5.6 Summary

This chapter discussed the data collection and analysis approach that was followed in this study. The qualitative content analysis process was discussed, where the 8 steps of qualitative data analysis were applied to prepare and analyse the gathered data. The software Atlas.ti was used in the analysis process. Codes were created and categorised. SSM was then applied; it assisted to generate themes for the study. The next chapter reports on the outcome of the study and illustrates the perspectives of the students regarding the DD in Swaziland using SSM techniques.

## CHAPTER 6: EMPIRICAL STUDY: REPORT ON THE FINDINGS

### 6.1 Introduction

The aim of this study was to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also determines what efforts can, according to these students, be made in Swaziland to help bridge the gap of this technological epidemic. In this chapter, the results and findings are presented using the selected SSM techniques.

### 6.2 Root definitions

A root definition (as per SSM) aids to clarify a situation, and also describes how the situation can be transformed for improvement (Burge, 2015:4). In SSM, RDs are derived using the PQR formula, i.e. P (*what*, which is the purpose) must be done according to Q (*how*, that is, the transformation process) to achieve R (*why*, which relates to the reason for change).

The researcher derived four RDs that are applicable for this study; they relate to: service delivery, availability of infrastructure, skills, as well as culture and technology acceptance. These elements, according to the participants, contribute to the DD in Swaziland. They are discussed next.

#### 6.2.1 Service delivery

Most of the participants were unsatisfied with the service delivery of the mobile networks (MTN and Swazi mobile) as well as SPTC, as the sole internet service provider (ISP). For example, all of the participants were dissatisfied with the service provider MTN. Even though a few participants indicated that they were satisfied with the service provider Swazi Mobile, many participants indicated their dissatisfaction with this service provider also. All the participants indicated that they perceive the service that SPTC offers was low in quality and too expensive. All of this relates to poor service delivery. Those staying in the rural parts of the country complained about service coverage being poor, with limited to no service.

Swaziland has only one ISP (i.e. SPTC) that also supplies the mobile networks (which are MTN and Swazi mobile) with internet capabilities, to re-sell to their customers. So, SPTC has a monopoly in terms of internet provision; this seems to result in extortionate costs and other service delivery inefficiencies. Healthy competition to ensure reasonable prices and efficient service delivery is important in every market sector. Therefore, fast, affordable internet connection that can reach every part of a country is needed. In conclusion, the participants (students) felt that they do not receive the level of service that they want/need/deserve, at an affordable price, in Swaziland; they would like a choice of (fast yet affordable) internet connections that offer adequate coverage

in all parts of the country, including rural areas. The government can play a role in promoting healthy competition. The envisaged service delivery is summarised in Table 6-1 below.

**Table 6-1: Service delivery PQR formula**

Root Definition	P	Q	R
RD	Better service	Eradicate monopoly	Government

**6.2.2 Availability of infrastructure**

Many participants indicated that they do not have a computer and/or access to the internet at home. Many participants indicated that they did not have a computer and/or access to the internet in primary school; a smaller number of participants indicated that they did not have a computer and/or access to the internet in secondary school. Free facilities provided at university are in some instances of poor quality; such as old, malfunctioning equipment and internet access with many pop-ups such as advertisements that distract them; internet access is also capped to 3GB per month per student. So, many participants felt that they did not have sufficient access to infrastructure (computers and the internet) and that widened the DD in Swaziland; adequate and available facilities are required in schools for proper learning to take place. Ensuring availability of good quality computers and faster internet connections are vitally important for learning, whether it be at primary, secondary or higher (university) level of education.

Participants indicated that they do not have access to proper, affordable infrastructure, especially in rural areas. Most preferred mobile devices such as phones because of their portability and convenience and also because of affordability. A phone is much easier to obtain and cheaper. Browsing may be faster from a phone; yet, it may be limited in functionality due to, for example, smaller screens etc. Proper access to facilities for all, including at/near homes and in rural areas, assists to lessen a DD. They also indicated that the government could do more in terms of providing, for example, accessible and affordable computer centres in rural areas. Comments on ideal availability of infrastructure are summarised in Table 6-2 below.

**Table 6-2: Availability of infrastructure PQR formula**

Root Definition	P	Q	R
RD	Better infrastructure	Build useful infrastructure	Government

**6.2.3 Skills**

Most participants indicated that they have difficulties in accessing the internet; a few participants indicated that they felt that they lacked the necessary computer skills required in higher education (at university). Most participants felt that the government should invest more in order to promote ICT learning; a few participants agreed that proper investments (by the government) in ICT infrastructure should aid in bridging the DD. This means that the participants (students) felt that they are not getting the support in Swaziland that they want/need/deserve to enable them to acquire necessary skills—they live in the digital age, but lack supporting learning facilities in schools. Even at university level most participants only received basic computer training and no internet training. Hence, they find it difficult (or sometimes even impossible) to improve their skills in this regard. So, they indicated that universities should offer more affordable advanced training to all students. Furthermore, teachers in primary and secondary schools are not sufficiently skilled in ICT. Acquiring the necessary skills is fundamental to bridging the DD. Only a few indicated that English (not their native language but the teaching medium in all schools and also the dominant language on the internet) is a barrier for them to obtaining skills and learning to use facilities properly. The needed skills area is summarised in Table 6-3 below.

**Table 6-3: Skills PQR formula**

Root Definition	P	Q	R
RD	Better skills	Make courses available	Universities/schools/government

**6.2.4 Culture and technology acceptance**

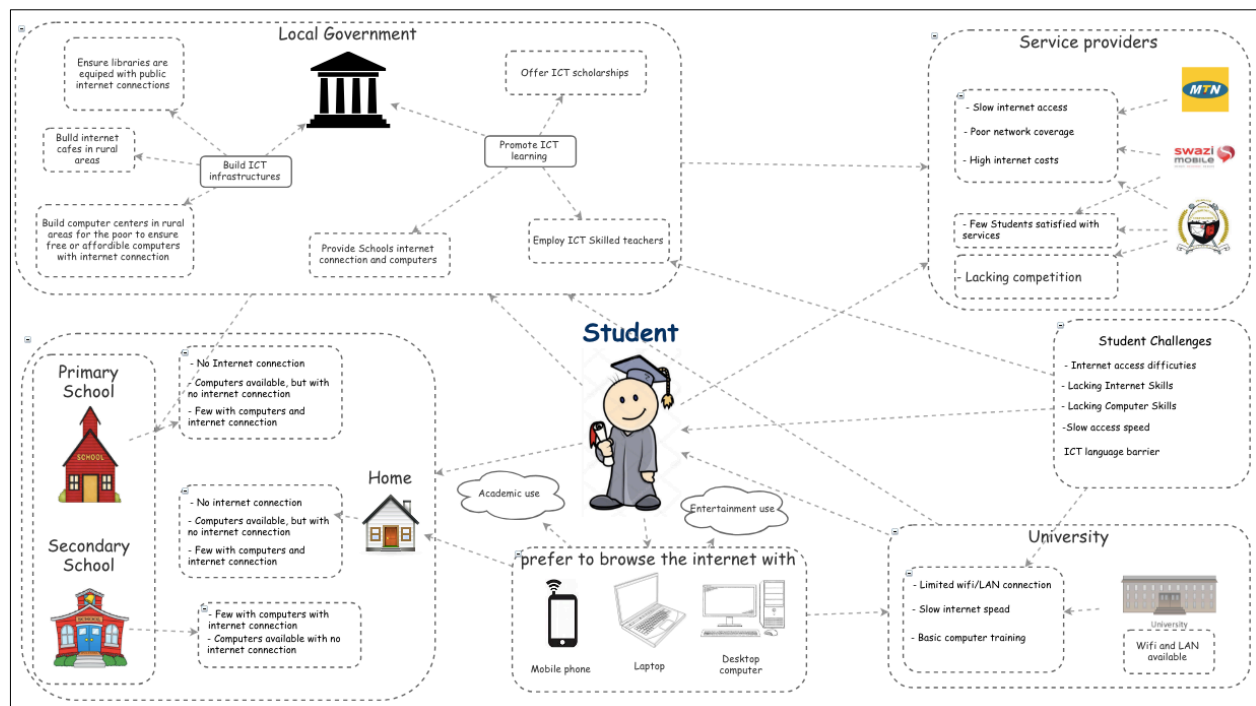
Only one of the participants indicated that s/he believed that technology was not good for children, as s/he felt that it can be misused. She believed this because of cultural roots and upbringing. This view seems to be in the minority among students. Still, beliefs such as this widen the DD. In this instance, a paradigm shift about technology is required so that parents expose their children to the positive aspects of technology as indicated in Table 6-4.

**Table 6-4: Culture and technology acceptance QPR formula**

Root Definition	P	Q	R
RD	Accept technology	Change cultural views where needed	Students

### 6.3 The rich picture illustrating the perspectives of the students

Figure 6-1 is a rich picture that illustrates the perspectives of the students of Swaziland regarding the DD. It indicates the impact of the DD, according to the students, on them, showing how/where it affects them most in school and at university, as per the service delivery of service providers, and in the (lack of) support from the government. The picture gives examples as to how the students feel these areas can be improved upon. It also indicates the students' need to have access to personal devices, so as to be digitally connected, for both academic and entertainment purposes.

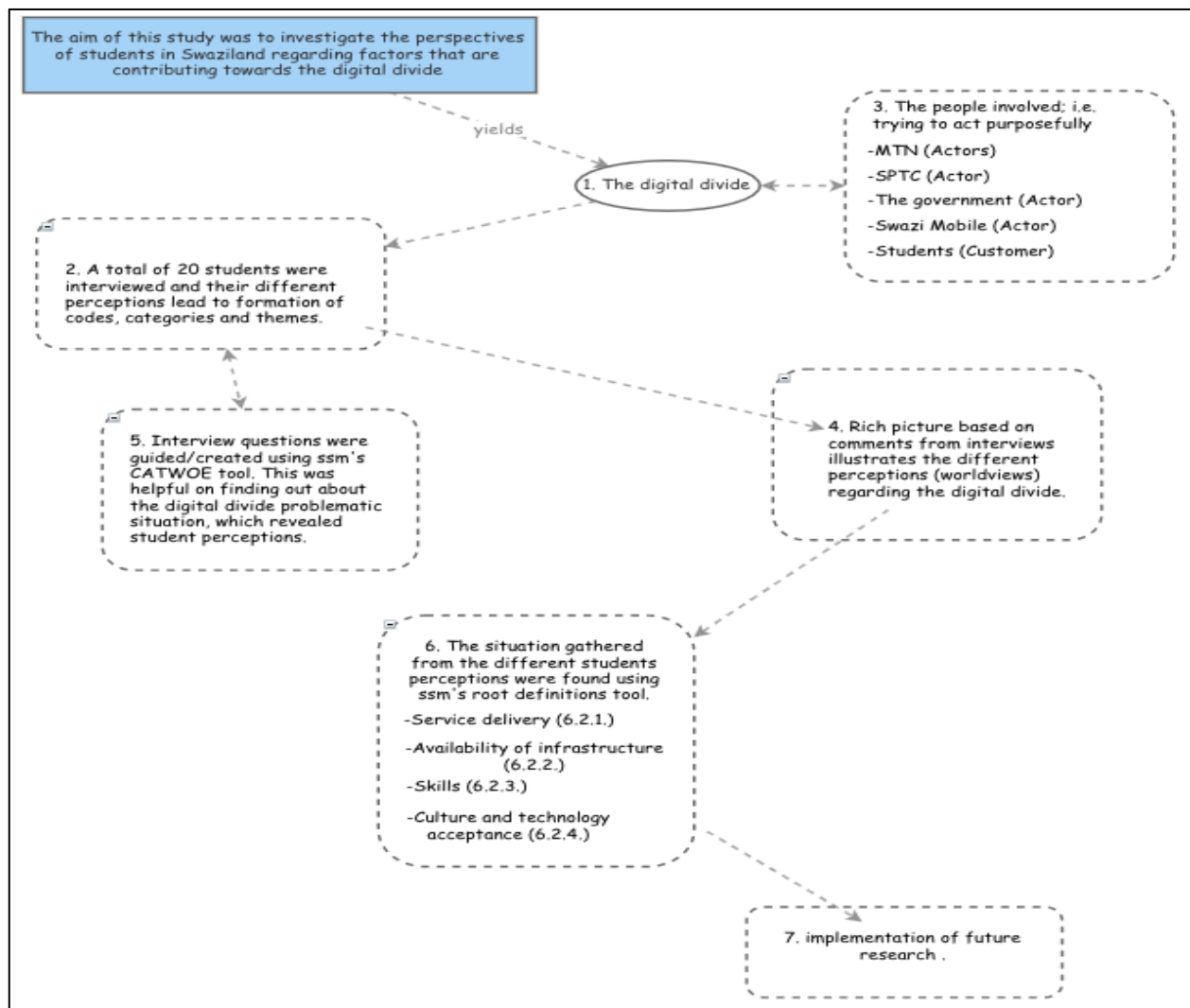


**Figure 6-1: Rich picture showing student perceptions of the digital divide**

The factors that had the most impact towards the DD according to students were; poor service delivery, unavailability of infrastructure, and lack of ICT skills. The service provided to the students was unsatisfactory; cost and quality wise. The students feel they are lacking the ICT resources (infrastructure) that can help them achieve knowledge and acquire proper skill set to help them improve their IT skills.

### 6.4 The human activity system illustrating the DD in Swaziland

Below Figure 6-2 summarises the DD situation in Swaziland, as per this study. This illustrates the research objective yielded from the DD (as a problem), the customer (i.e. the students) and actors (i.e. service providers) as well as owner (i.e. the government). It also shows the number of students interviewed, the formulation of interview questions, the rich picture drawn, the root definitions and future research of the study and further illustrates the SSM tools applied in this study.



**Figure 6-2: The DD in Swaziland**

## 6.5 Summary

This chapter summarises the empirical findings and results of the study. It is structured using SSM techniques, such as RDs (that explain the required transformation through table illustrations), a rich picture (that visually illustrates the perspectives of the students regarding the DD in Swaziland) and the derived human activity system.

## **CHAPTER 7: CONCLUSION**

### **7.1 Introduction**

The aim of this study was to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also determined what efforts can, according to these students, be made in Swaziland to help bridge technological gap. In this chapter, the primary and secondary objectives of the study are discussed—the researcher indicates how they were achieved in this study. This chapter discusses the steps that the researcher followed to ensure rigor in this study. It also presents recommendations of future research.

### **7.2 Secondary objectives**

The secondary objectives of the study were divided into theoretical and empirical objectives. This section discusses how they were met.

#### **7.2.1 Theoretical objectives**

The theoretical objectives were met as follows: Chapter 2 contains a literature review on the factors that cause a DD, and the effects of a DD. SSM was positioned and discussed in Chapter 3. An overview of research paradigms, so as to motivate the chosen research paradigm for this study, was given in Chapter 4; it motivated the choice to conduct the research in the interpretive research paradigm and detailed the integration of interpretive data analysis with SSM.

### **7.3 Empirical objectives**

The empirical objectives in this study were met as follows: Participants were interviewed until data saturation was reached; participants included students from the University of Swaziland, in order to understand their perspectives of the DD in Swaziland (refer to Chapter 4 for detail relating to the participants). Gathered data were analysed (refer to Chapter 5) and presented (refer to Chapter 6) according to the research plan (outlined in Chapter 4).

### **7.4 The primary objective**

The study's primary objective was to investigate the DD from the perspectives of students in Swaziland. The researcher, therefore, aimed to understand how the DD affects them, and what they think can be done to improve the DD in Swaziland. This objective was achieved. Chapter 5 summarises the challenges that the students face and the transformation needed, according to the students, to improve the DD in Swaziland. Gathered data were analysed by coding and the categorisation of codes. These were allocated to SSM themes, so as to structure the findings and identify transformations required. Actors/owners that could implement/drive transformations were

also identified. They should work together to assist the customers (i.e. the students) to bridge the DD in Swaziland. Finally, Chapter 6 reports on the findings by providing RDs (Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4) that indicate the main areas of recommended transformation for improvement, according to the students. A rich picture (Figure 6-1) that visually illustrates the perspectives of the students regarding the DD in Swaziland, and a human activity diagram (Figure 6-2) that summarises the study have been included.

## **7.5 Rigor of the method**

This interpretive study was successful. Interpretive interviews enabled gathering of rich data that the researcher used understand the perspectives of the students of Swaziland towards the DD, and transformations they felt can improve the DD. Specific principles to ensure rigorous interpretive research (Klein and Myers (1999:72) are discussed next as they were applied in the study.

### **7.5.1 The fundamental principle of hermeneutics circle**

Enough participants were interviewed to facilitate appropriate understanding of the students' perspectives—students were interviewed until data saturation was reached, that is, no new codes emerged. Interviews were recorded and transcribed. The researcher sought to understand rather than explain the perspectives of the students. The students' perspectives that emerged also reflected the literature that was reviewed in Chapter 2, for example causative factors of DDs in developing countries. The areas identified that require transformation, such as service delivery, infrastructure, skills, as well as culture and technology acceptance surfaced during the literature review also. The students' perspectives were also illustrated in the rich picture in Figure 6-1.

### **7.5.2 The principle of contextualisation**

The aim of the study was to understand the DD in the context of Swaziland, by using students. This aim was achieved as the outcome reflects the perspectives of students in Swaziland. The theoretical findings ensured the illustration of the historical background of the DD. Some questions in the interviews paid attention to the technological background of the students, such as when they were requested to tell about computer facilities at school and at home. The students' perspectives that emerged from the interviews also reflected culture and its effect on technology acceptance, since one student felt technology was not good for the youth. All empirical content was translated and illustrated according to the responses given by the participants. No biased input from the researcher was included in the empirical findings, which are portrayed in Chapters 5 and 6.

### **7.5.3 The principle of interaction between the researchers and the subjects**

During the interviews the researcher listened to the responses of the participants and did not judge or attempt to persuade them to change their viewpoints. Viewpoints were included in the study as-is. Students were allowed to respond in their native language (siSwati). Responses were carefully transcribed and translated where necessary. The researcher's native language is also siSwati, but he was schooled and received tertiary education in English, so he could comfortably translate responses. The focus of the interviews remained consistently on understanding the DD through the eyes of the participants (i.e. the students). Students felt comfortable enough to share honest views.

### **7.5.4 The principle of abstraction and generalisation**

Interviews were transcribed. Data were then analysed through coding and categorised. SSM was applied to structure the results of the interviews, i.e. the analysed data. The formulation RDs aided in the formulation of possible transformation actions, as per the views of the students. The rich picture (Figure 6-1) visually illustrates the students' perspectives. The human activity system (Figure 6-2) furthermore illustrates the activities structured to outline what was done to understand the DD phenomena in this study.

### **7.5.5 Principle of dialogical reasoning**

The researcher took care not to misinterpret results. Interviewees were allowed to respond in a conversational style using comprehensive responses. The steps of data analysis that were followed to ensure proper analysis of the data (Chapter 5). Participants were encouraged to voice their opinions without fear of being judged.

### **7.5.6 The principle of multiple interpretations**

Different perspectives were reflected by different participants. All viewpoints have been included in the study and in the results as contained in Chapter 6. Even exceptions, such as the one student that indicated that she finds technology to be a threat, were included in the results.

### **7.5.7 The principle of suspicion**

All data in the study were carefully transcribed. No response was disregarded during this process. Students were asked to sign a consent form before the interview, as an indication of voluntary participation, and they were assured of anonymity. The formation of codes and categories were done through careful consideration of thorough data analysis steps (refer, for example, to the description and application the steps in Chapter 4 and Chapter 5). SSM tools were then applied in to aid data analysis and presentation of analysed data.

## 7.6 The value of SSM in this study

In this study SSM was used to structure the study, and aid data analysis and visual presentation of results. SSM enabled a visual representation of the study; it gave better understanding on what was gathered from the students' perspectives. The perspectives were analysed by means of a series of SSM techniques (summarised in Table 7-1). In conclusion, it complemented the qualitative data analysis approach applied, that is grounded theory, and enabled a better, more diverse way of looking at the DD phenomenon.

**Table 7-1: SSM tools and their value**

SSM tool	Tool value
CATWOE	Formation of interview questions
	Formation of themes
Rich picture	The formation illustrated the perspectives of the students regarding the DD in a visual manner which could be easily understood.
RD	It brought about clarity of the DD situation, and also described how the situation could be transformed for improvement by using the RD formula.

## 7.7 Recommendations for future research

The University of Swaziland is the only institution that participated in this study. The institution was chosen because, currently, it is the only university that is recognised by the South African Qualifications Association (SAQA). Future research may also need to include other higher education institutions in Swaziland. Future research may also compare results from Swaziland with results from other African countries.

The researcher included one campus of the University of Swaziland, that is the Mbabane campus. This campus has students from all over Swaziland studying the Health Sciences. For this study, it was thus regarded as representative of all. However, future research could include all three campuses.

Demographic information such as gender and age were not included in the gathering/analysis of data in this study. The study also focused on a relatively homogenous group, i.e. students. It would be recommended for future research to also explore how different genders and age groups are affected by the DD.

## **7.8 Summary**

The aim of this study was to investigate the perspectives of students in Swaziland regarding factors that are contributing towards the digital divide (DD). The study also determined what efforts can, according to these students, be made in Swaziland to help bridge the gap of this technological epidemic. This study achieved its primary and secondary objectives. The researcher demonstrated that he can rigorously apply a suitable methodology to investigate an identified research problem. This chapter discussed achievement of the study's objectives, rigour of the method, and how SSM added value to the study. SSM successfully complemented the grounded theory method applied to analyse gathered data. Future research was also identified.

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