



Using mobile phones to support learning: A case of UCT first year female science students in the Academic Development Programme.

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## **Abstract**

In recent years, South African universities have been faced with increased massification as a result of more students entering higher education institutions. Some of the students are from poor communities such as rural areas and former black townships which are still educationally disadvantaged. These students, who have been described as ‘digital strangers’ in other studies, have had very little access to or had never used computers prior to university. With increased computerisation in higher education institutions, digital strangers face problems integrating into computer based learning.

In contrast to computer access, mobile phone ownership is pervasive and ownership is not socially differentiated in the South African context. This study therefore sought to explore the use of mobile phones to support learning by first year female science students in an extended academic program at the University of Cape Town.

Using critical theory, Gee’s notions of Big (D) and little (d) discourses and a qualitative case study methodology, the study examined student’s technological identities. Whilst the results of the study show the powerlessness that digital strangers feel when exposed to computers during their first year of study, the results also show that students identify with their mobile phones because the technology is part of their Discourse. The mobile phone provides emancipation and empowerment that the students need to survive in a challenging science fields through informal and affective learning necessitated by the various internet enabled applications of the technology.

The study also showed that students found transferable skills from their mobile phones to computers, thereby enhancing their transition into computer based learning. The study recommends that higher education institutions should consider mobile phones as viable learning tools and the technology should not be regarded as separate from the computer, but rather the two should be viewed as complimentary educational tools.

Key words: mobile phone/cell phone, applications, informal and affective learning

**Compulsory Declaration**

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation for the work, or works, of other people has been attributed, and has been cited and referenced.

Signature \_\_\_\_\_

Date \_\_\_\_\_

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## Table of contents

Abstract.....	i
Compulsory Declaration.....	ii
Table of contents .....	iii
List of Tables and Figures .....	vii
List of Abbreviations.....	viii
Acknowledgements .....	ix
Chapter 1	1
Introduction	1
1.0 Overview.....	1
1.1 Main concepts of the study .....	2
1.2 Research topic .....	3
1.2.1 Research question .....	3
1.2.2 Research sub-questions.....	3
1.3 Aims and objectives of the study .....	3
1.4 Rationale .....	4
1.5 Structure of the dissertation .....	5
1.6 Summary of chapter.....	6
Chapter 2	7
Literature review	7
2.0 Introduction.....	7
2.1 ICTs in developing contexts .....	7
2.2 HEIs in South Africa: historically white and historically black universities.....	9
2.3 Information communication technologies in HEIs .....	10
2.4 Science and technology in South Africa.....	14
2.5 Gender and sciences .....	16
2.6 Gendered use of ICTs .....	19
2.7 Informal learning.....	21
2.8 Affective learning.....	23
2.8 Chapter Summary.....	24
Chapter 3	25
Theoretical and Analytical Frameworks	26
3.0 Introduction.....	26
3.1 Theoretical framework: Critical theory .....	26
3.1.2 Habermas and Critical theory.....	27

3.2 Analytical tool: Critical Discourse Analysis.....	28
3.2.1 Context, meaning identity and power.....	31
3.3 Chapter summary.....	34
Chapter 4	35
Research design	35
4.0 Introduction	35
4.1 Research approach.....	35
4.2 Site selection.....	36
4.3 Participants.....	37
4.4 Research methods.....	37
4.4.1 The survey.....	37
4.4.2 Semi structured interviews.....	39
4.4.3 Digital presence on Facebook.....	40
4.5 Data Analysis.....	41
4.6 Validity.....	41
4.7 Ethics.....	42
4.8 Chapter summary.....	42
Chapter 5	43
Findings and Analysis	43
5.0 Introduction.....	43
5.1 Data from survey questionnaires.....	43
5.2 Data from interviews and Facebook.....	44
5.3 Precious's story.....	46
5.3.1. Female science Students.....	46
5.2.2. Rural and former black township background.....	47
5.2.3 Computers and cell phones in background.....	47
5.2.4 Integrating into UCT a cosmopolitan HWU institution.....	48
5.2.5 Problems in integrating into computer based learning.....	49
5.2.6 Technology mostly used by female students.....	49
5.2.7 Mobile phones for informal and affective learning.....	50
5.2.8 Transition into computer based learning.....	51
5.3 Fudge's story.....	52
5.3.1 Female science student.....	52
5.3.2 Rural and former black township background.....	53
5.3.3 Computers and cell phones in background.....	53

5.3.4 Integrating into UCT a HWU institution .....	54
5.3.5 Problems in integrating into computer based learning .....	54
5.3.6 Technology mostly used by female students .....	54
5.3.7 Mobile phones for informal and affective learning .....	55
5.3.8 Transition into computer based learning .....	56
5.4 Bianca's story .....	57
5.4.1 Female science student .....	57
5.4.2 Rural and former black township background .....	58
5.4.3 Computers and Cell phones in background .....	58
5.4.4 Integrating into UCT a cosmopolitan HWU institution.....	59
5.4.5 Problems integrating into computer based learning .....	59
5.4.6 Technology mostly used by female students .....	60
5.4.7 Mobile phones for informal and affective learning .....	60
5.4.8 Transition into computer based learning .....	62
5.5 Faith's s story .....	62
5.5.1 Female science student .....	62
5.5.2 Rural or former black township.....	63
5.5.3 Computers and cell phones in background .....	63
5.5.4 Integrating into UCT a cosmopolitan HWU institution.....	64
5.5.5 Problems in integrating into computer based learning .....	64
5.5.6 Technology mostly used by female students .....	65
5.5.7 Mobile phones for informal and affective learning .....	66
5.5.8 Transition into computer based learning .....	68
5.6 Summary of Analysis .....	68
5.6.1 Context.....	68
5.6.2 Power .....	69
5.6.3 Identity .....	70
5.6.4 Situated meaning .....	70
5.7 Chapter Summary .....	70
Chapter 6 .....	72
Discussion of Findings .....	72
6.0 Introduction .....	72
6.1 Summary of research questions.....	72
6.1.4.1 Support through affective learning .....	74
6.1.4.2 Support through informal learning .....	75
6.2 Overall summary .....	77

6.3 Chapter Summary .....	78
Chapter 7	79
Conclusion	79
7.1 Final Comments .....	79
7.2 Recommendations .....	80
7.3 Limitations of the Study .....	82
7.4 Recommendations for further study .....	82
7.5 Overall summary of the study .....	82
References	84
Appendices	96
Appendix A: Consent Form for Research Participants	96
Appendix B: Information sheet about the research project	97
Appendix C: Questionnaire	98
Appendix D: Interview Schedule	99
Appendix E: Precious's Interviews	101
Appendix F: Fudge's Interviews	103
Appendix G: Bianca's Interviews	105
Appendix H: Faith's Interviews	107

## List of Tables and Figures

### Tables

Table 1: Typology of informal learning.....	30
Table 2: Data Collection dates.....	49

### Figures

Figure 1: Access by socio-economic group.....	13
Figure 2: Type of Internet access for low socio-economic group students .....	14
Figure 3: Access to ICTs off campus by students.....	43
Figure 4: Access to computers off- campus.....	44
Figure 5: Cross-section of students' use of cell phones.....	44
Figure 6: Precious's Facebook Posting.....	51
Figure7: Fudge's Facebook Posting.....	56
Figure 8: Bianca's Facebook Posting.....	61
Figure 9: Faith' Facebook Posting.....	67

## **List of Abbreviations**

ADP	Academic Development Program
GEPS	General Entry Program in Sciences
HBU	Historically Black University
HWU	Historically White University
HEI	Higher Education Institution
ICT	Information Communication Technology
UCT	University of Cape Town

University of Cape Town

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# Chapter 1

## Introduction

### 1.0 Overview

Information Communication Technologies (ICTs) has become central to teaching and learning in higher education institutions (HEIs) (Goode, 2010). As such HEIs around the world invest in ICTs particularly computers and the internet under the assumption that the students entering university doors in the new millennium are digital natives who have spent their entire lives surrounded by computers and various digital tools (Prensky, 2001). Whilst the assumption is true in other contexts, the situation is different in the African context; digital divide is still a reality on the continent, with access and use of ICTs heavily dependent on socio-economic status (Brown, Czerniewicz and Pederson, 2008; Czerniewicz, Williams and Brown, 2009). ICTs which have become pervasive for many people in developed countries are still foreign to many people in Africa (Krishna and Madon, 2007; Alvero and Sanchez, 2009).

In South Africa the digital divide is defined by huge socio-economic disparities as a result of the apartheid era (Martindale, 2002). Year after year HEIs in South Africa are faced with a diverse group of first year students, among them a group of marginalised students who had limited access to or had never been exposed to computers prior to university life due to poor socio-economic backgrounds and thus face challenges integrating into computer based learning (Czerniewicz, Williams and Brown, 2009).

South Africa has the third largest mobile internet using population in the world and ranks sixth in the global top 10 for mobile internet usage ahead of both the United States of America (at 7<sup>th</sup>) and the United Kingdom (at 9<sup>th</sup>) (Kreutzer, 2009). Kreutzer (2009) also noted how computers and the internet remain in the hands of a selected few in South Africa whilst mobile phone penetration has sky rocketed with the most remote areas in the country accessing mobile networks. In his survey of low-income South African youth Kreutzer (2009) discovered that 83% of the participants access the internet with their mobile phones on a typical day. His study showed that mobile phones are particularly prioritised among the youth. Thus, though the marginalised students might not have seen or used a computer before university, the mobile phone had been part of their lives. However, HEIs are not maximising the mobile phone for learning (Hodgkinson-Williams and Ng'ambi, 2009). This study therefore, seeks to show how students from poor socio economic backgrounds, particularly

girls in a male dominated sciences field who are also culturally marginalised in most African societies, are exploiting the mobile phone for informal and affective learning.

### **1.1 Main concepts of the study**

**Disadvantaged background** – The study is focused on students from poor socio-economic backgrounds. These students come from economically marginalised rural areas or former black townships which are characterised by insufficient or lack of basic amenities, including access to ICTs especially computers and the Internet as a result of the unequal distribution of resources during the apartheid era (Christie, 2008).

**First year female science students** – Though there has always been concern on the integration of first year students into university life (Rhodes and Nevill, 2004), this study will concentrate on first year female science students. Science subjects have always been associated with men rather than women. Hudson (1972) found that school pupils and students associated science with masculinity and arts with femininity. These stereotypes have had much wider connotations especially in Africa as ‘science’, ‘masculinity’, ‘hardness’ and value are all apparently associated with perceptions that have led to marginalisation of female students in science related programs (Thomas, 1990). This bias has extended to ICTs as too often females are the most unprepared for the digital college environment (Farrell, 2005; Margolis and Fisher, 2001). The bias compounded with the disadvantaged background complicates the integration of first year science female students into an ICT based learning environment.

**Mobile phones for learning-** Studies have shown that in contrast to computer access, cell phone ownership is pervasive and ownership is neither gender nor socially differentiated, and that despite cost implications the spread of internet access via cell phone is even across socio economic groups (Czerniewicz, Williams and Brown, 2009). Given that Africa has the highest quota of mobile phone subscribers per 1,000 inhabitants in the world and that South Africa has the third largest mobile internet using population in the world (Brown and Ng’ambi, 2012), this study will look at the use of mobile phones by disadvantaged female students to support learning including the internet and online social networking applications.

**Learning-** The learning in this context is mainly informal and affective learning

- Informal learning is widely used to describe the many forms of learning that takes place independently from instructor-led programs, it usually occurs in a variety of places, such as at home, work, and through daily interactions and shared relationships among members of society (Coombs and Ahmed, 1974). Tough (1999) discovered that within each informal learning episode (where the primary motivation is to gain

and retain certain knowledge and skill on a task or thing), the average learner interacts with an average of ten people. In this study the mobile phone's applications provides the platform for these social interactions.

- Affective learning involves the acquisition of behaviours involved in expressing feelings, attitudes, appreciation and value (Picard, 2004). Wlodkowski (1985) points to the importance of setting an emotional climate conducive to social relations which would aid cognitive learning. In this study female science students used mobile phone applications such as Facebook, Blackberry Messenger, Whatsapp and Mixit as platforms to express their feelings to gain emotional support from friends and family despite the challenge of distance.

## **1.2 Research topic**

This research investigates the use of mobile phones by first year female students from disadvantaged backgrounds in a science program at University of Cape Town (UCT).

### **1.2.1 Research question**

How do first year female science students from disadvantaged backgrounds use mobile phone to support their academic life at a Higher Education Institution?

### **1.2.2 Research sub-questions**

- I. What problems do first year female science students from disadvantaged backgrounds face with regards to integrating into computer based learning?
- II. What technologies do first year female science students from disadvantaged backgrounds mainly use at university?
- III. In which ways can the use of mobile phones liberate and support students' academic life?
- IV. How can the use of mobile phones assist students' transition into computer based learning?

## **1.3 Aims and objectives of the study**

The main objectives of this study is to illuminate the problems that first year female science students from educationally disadvantaged background face in integrating into computer based learning at university and their use of mobile phones as a complimentary technological tool.

The study aims to provide possible solutions to the transition of female students from disadvantaged families, through the use of mobile phones, a technological tool that is not only familiar to them but plays a very important role in internet connection and online social networking.

## 1.4 Rationale

This study was triggered by the research project on the Access and Use of Information Communication Technologies (ICTs) by university students from across South Africa, run in the Centre of Educational Technology (CET) department at the University of Cape Town (UCT). The research has shown over a period of seven years that a disparity exists among students' access to and use of ICTs mainly as a result of differing socio-economic backgrounds (Czerniewicz, Williams and Brown, 2009). As universities commit to the use of ICTs for learning, (especially computers) there is a group of students from disadvantaged backgrounds, also known as 'digital strangers' who face problems integrating into computer based learning (Czerniewicz, Williams and Brown, 2009). Yet, knowing how to utilise the technological ecosystem of university life is certainly critical for academic success (Goode, 2010).

Besides the fact that science programs demand a range of cognitive or intellectual skills, as studies reveal that in the African context, female students face more challenges in integrating into university life than their male counterparts due to socio-cultural beliefs (Wadesango, 2011). Oldham (2000) highlighted the following points about gender and sciences especially in the African context:

- In many countries, especially in Africa, there are fewer girls than boys who have access to primary education, and of those children that do have access, fewer girls than boys learn about science.
- In many countries, fewer girls than boys study scientific and technological subjects in either secondary or tertiary education.
- In many countries, fewer women than men pursue scientific or technological careers, and far fewer reach the top professional, managerial or policy-making positions.
- Technological changes, especially those designed to improve the quality of life in rural areas in developing countries, have been more directed to the tasks that men perform than to the tasks women perform, both in and outside the household. Development programs frequently have not considered this gender dimension.

The marginalisation of women and girls on the continent has also been perpetuated by ICTs as Gillward and Essler (2005) noted how mobile phones, computers and the internet are predominantly used by men especially in rural areas. Previous research in South African

universities shows that unlike female students, male students are more confident and autonomous with regard to ICTs (Brown and Czerniewicz, 2012).

However, other studies show that students from all walks of life, including those from disadvantaged backgrounds have mobile phones which they use extensively for internet connection (Kreutzer, 2009, Brown and Czerniewicz, 2010). The affordance of accessing internet connections on mobile phones and a wide range of other advanced functions (Libero, Ramos and Ranga, 2007), such as online social networking sites have increased the potential value of mobile phones for learning. Hodgkinson-Williams and Ng'ambi (2009) predicted this potential value of mobile phones in developing countries especially Africa, because of their swift take up rate.

For HEIs in South Africa the use of computers and the internet in teaching and learning dominates the use of mobile phones for this purpose (Hodgkinson-Williams and Ng'ambi, 2009; Brown, 2012). However, HEIs need to utilise the mobile phone as a digital empowering tool in learning, because for students in South Africa mobile phones are not just for texting, they are often the only route to the Internet, especially for the many who have little or no reliable computer access off campus (Howard, 2012).

## **1.5 Structure of the dissertation**

### **Chapter 1: Introduction**

The chapter presented the overview of the study, the research topic, research questions, the aims and objectives of the study and the rationale of the study.

### **Chapter 2: Literature review**

The chapter presents relevant literature on ICTs in Africa including gendered use of ICTs in the African contexts and ICTs in Higher Education Institutions in South Africa as well as informal learning and affective learning.

### **Chapter 3: Theoretical underpinnings**

The chapter presents the theoretical framework on which this study is grounded; it will also describe how theory has led to the focus of this study.

### **Chapter 4: Research design**

The chapter presents the methodology and design processes used in the study which include the research site, the basis of participants' selection and also the data collection, drawing on methodology literature to justify the methods used.

### **Chapter 5: Findings and analysis**

The chapter presents the findings giving the case study interview analysis and the digital presence analysis.

## **Chapter 6: Discussion**

The chapter outlines the discussion of the study in relation to the research questions and the findings of the study.

## **Chapter 7: Conclusion**

The chapter presents the final comments, the recommendations and overall summary of the study.

### **1.6 Summary of chapter**

This chapter presented an introduction or background context to the study, the main concepts as used in the study, research topic, research questions, aims and objectives. It also outlined the rationale of the study.

The next chapter presents the literature relevant to the present study.

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## **Chapter 2**

### **Literature review**

#### **2.0 Introduction**

In order to fully appreciate the complexity of this study it is important to understand the broader context in which it is situated. South Africa is a country classified as a developing context. Developing context countries are mainly countries that were ruled by Europeans for a long time, their economy is more agriculture based, and they are usually characterized by high mortality rates, high birth rates, high levels of poverty and large gaps between rich and poor (Oplatka, 2004). As such it is important to look at ICTs accessibility and use in developing contexts. The chapter shows the potential of mobile phones for learning in developing contexts and how it can be used especially to support informal and affective learning.

#### **2.1 ICTs in developing contexts**

Developing countries like the rest of the world have realised the potential value of ICTs for socioeconomic development and have therefore tried and are still trying with the help of international organisations and Non-Governmental Organisations (NGOs) to provide ICT services for all in the continent (Czerniewicz and Jaffer, 2007). Whilst providing ICT access is an important contribution for the development of nations and individuals, the lack of access to such technology can lead to deepening social and cultural inequities (Salinas and Sanchez, 2009) especially in Africa where states are burdened with high levels of poverty and large disparities in socio-economic levels (Fleming, 2002).

Barnard and Vonk (2003) and Fleming (2002) have noted how poverty and socioeconomic disparities are symptomatic of Africa in general. They argue that some African states are marginally ahead in the race to equip themselves with effective ICT infrastructures that include telephone lines, access to electricity, low internet access costs, policy and legislative platforms. They conclude however, that some African states lag far behind in the basic requirements for ICTs to play a meaningful and sustained role in people's lives.

For South Africa, the current and future capacity to generate and sustain access to ICTs for its citizens is an important development priority (Thlabela, Roodt, Paterson and Weir-Smith, 2006). However the legacy of apartheid has caused the access of ICTs to impact differently in the country, depending on diverse generic categories of users namely age, wealth, vocation and education among other things (Gillward, Esseler, Button and Stavrou,

2005). The socio-economic segregation in South Africa has meant that only a few have access to ICTs such as the computer and Internet, creating what Castells (1996) has termed the 'digital apartheid'. The exclusion is understood in terms of unequal access (the digital divide); Warschauer, Knobel, and Stone (2004) noted that unequal access to technologies serves to exacerbate social stratification, whilst equal access can reduce marginalisation. The impact of ICTs can be viewed in the way technology use enables individuals to participate and be part of society, which is the extent to which 'ICTs enhance our abilities to fulfil active roles in society, or being without them constitute[s] a barrier to that end' (Haddon, 2000: 389).

Most of the poor population in South Africa live in rural areas or former black townships and these areas have poor infrastructure development (May, 2000). The people living in these areas have limited or no access to computers and the internet at all, whilst the few elite in affluent urban areas have almost unlimited access to these ICTs. South Africa's digital divide therefore, follows shifting and complex lines as some distinctions demarcate the computer-based information practices of much wealthier (though very small) upper and middle classes from the analogue sources available to the impoverished majority (Kreutzer, 2009). According to Gillward and Essler (2005) despite these disparities, South Africa has no integrated ICT policy framework to ensure that ICT services are not utilised by the privileged few. They noted however that many people who do not have access to the internet in the country generally regard their access to mobile phones as adequate replacement for the internet.

Mobile phone growth in Africa has taken a surprising turn. Ng'ambi (2006) noted how in most African countries the diffusion of the cellular (mobile) phones has been remarkable. Africa has the highest quota of mobile phone subscribers per 1,000 inhabitants in the world, estimated that in next 5 years, Africa's buying of mobile phones will be 550%, 16% have a home telephone (land line) (down 2% since 2008), 70 % personally own a cell phone (Brown and Ng'ambi, 2012). Whilst the penetration of computers and internet has been an issue in South Africa, mobile phones have experienced a swift take up rate. Mobile phones can be said to have reduced this digital divide in South Africa, since Kreutzer (2009) noted how for a country still trying to escape its legacy of dramatic racial inequalities, South Africa has enjoyed a spectacular growth of mobile phones over the past decade, with 60% of South Africans above 16 years already owning mobile phones for themselves. Whilst the phrase the digital divide usually appears in articles and press releases to refer to the disparity between people and communities with and without access to digital information, (Ramos,

2008) the increased use of the mobile phone especially the potential of mobile internet might mean reduction of the digital divide in the South African contexts. Put simply, there is a large group of users who access the internet for the first time via data enabled mobile handsets, as high-end smart phones promise browsing experiences which are steadily closing the gaps in speed and ease of use which has hampered earlier incarnations of the mobile internet, such as WAP (Donner and Gitau, 2009). Kreutzer (2009) who did an extensive study on online and digital media usage on mobile phones among low-income urban youth in South Africa, argued that the increased use of mobile phones and mobile internet does not mark the end of the digital divide paradigm, but it questions the validity of a clear cut division based merely on access or adoption, while the actual lines between internet users and non-users might be much harder to draw.

## **2.2 HEIs in South Africa: historically white and historically black universities**

Since this study is situated at University of Cape Town an institution described as a historically white university, it is important to understand the social and political meanings associated with the institution in the South African context since the terrain of the country's HEIs is somewhat different to any other country.

In terms of the apartheid vision for education, higher education was segregated into institutions reserved for white South Africans and institutions tasked with providing limited tertiary education to those who were not classified white (Centre for Higher Education, 2010). Universities were generally categorised into Historically White Universities (HWUs) and Historically Black Universities (HBUs), the former served a privileged predominantly white and few Indian students and these universities were well supported by the apartheid regime in terms of qualified academic staff, educational and financial resources (Cooper and Subotsky, 2001).

Cooper and Subotsky (2001) purport that HBUs were under resourced universities that served predominantly black and coloured communities and heavily depended on national government for financial support. While the institutional mergers in democratic South Africa have combined institutions across these boundaries, there are still significant differences in the resourcing, skill levels and outputs of those institutions that were historically white (the historically advantaged universities or HAUs) and those that served other racial groups (the historically disadvantaged universities or HDUs) (Council for Higher Education, 2010). According to Chaney, Muraskin, Cahalan, and Goodwin (1998)

*“Disadvantaged students may notice differences from the general student population in such areas as race/ethnicity, academic preparation, income, and culture, so they feel that they do not fit in.*

*They may also be less likely to engage in behaviours that will increase their sense of belonging and that are related to college retention; for example, attending full time and interacting frequently with students, faculty, and staff” (p. 198).*

De Sousa and Kuh (1996) argued that black female students who attend predominantly black institutions usually benefit from a supportive social cultural and racial environment, these enhance their successful adaptation to their academic demands and the opposite is true for students entering cosmopolitan HWUs. Furthermore, the alienation and powerlessness of students from previously disadvantaged communities could be attributed to limited capability in engaging with their historically privileged peers, perceived lack of belonging, and lack of adequate integration into these elite learning environments (Rambe, 2009). The Council for Higher Education (2010) highlights that during apartheid there were further distinctions among the white universities, between the English-speaking and Afrikaans-speaking institutions which aligned with different political and ideological positions, the reports argue that although these distinctions have become blurred in the past decade and continue to influence the culture of institutions and campuses.

Erasmus and de Wet (2003) report on a UCT Health Sciences Faculty study which showed that black students were under pressure to perform, as they constantly have to prove themselves worthy to disprove white staff and students’ stereotypical perceptions of black students, “they are expected to lose parts of their identities in order to fit into a white world, and they are expected to be extraordinary in order to be recognised” (p. 38). This institutional culture of assimilation could work to undermine the self-esteem and self-worth of some disadvantaged students. Thus, their situation is difficult enough without the complication of imposed computer based learning which they are ill prepared for.

### **2.3 Information communication technologies in HEIs**

HEIs in developing contexts are on the forefront of equipping the future labour force with much needed skills and knowledge for the trade and industry economy. In this study, it is necessary to look in detail at how these institutions have embraced and used ICTs as tools to enhance the teaching and learning process.

According to Ayo (2009), Africa’s higher education system is probably the most internationalised in the world – not by participation, but by omission, as the weakest global higher education system as it relies heavily on the discourse paradigms set by others, rendering it vulnerable to global whims and idiosyncrasies. Ayo (2009) further argues that higher education is an increasingly complex phenomenon throughout the world, characterised by worldwide growth in demand and the provision of access, diversification and privatisation

and increasing global interaction; thus, African universities can neither afford to blissfully ignore the new forces of transnational education nor embrace them blindly. HEIs have prioritised and embraced the use of ICTs especially computers and the Internet for learning, however, Dayinsindhu and Pradeep in Krishna and Madon (2003) argue that regions should discover their own unique strength by taking the challenges head on and developing a model that is rooted in their own economic, social and cultural contexts.

Guðmundsdóttir (2010) noted that socio-cultural and political factors are responsible for limited impact of ICT in education in some developing countries. In South Africa the digital divide is directly related to material inequalities that are part of the legacy of apartheid and colonialism (Zegeye and Harris, 2002), these factors further shape educational opportunities and access to education in general in South Africa (Campbell, 2001; Crouch and Mabogoane, 2001; Murelli, 2002). However, since obtaining democracy in 1994, South African HEIs are faced with increased massification and diversity because of more students entering universities (Jansen 2001; Department of Education, 2004; Gillard, 2004; Brown, Czerniewicz and Pederson, 2008). According to Cooper and Subotsky (2000) there probably has been no country in the past century, which has witnessed as rapid a transformation of the student ethnic composition of its higher education institutions as observed in South Africa since the 1990s. A huge number of the students entering South African universities are from previously disadvantaged groups. These students are from poor areas such as rural areas and former black townships, which are still educationally disadvantaged in terms of access and use of ICTs. The students come from previously disadvantaged black or coloured schools situated in rural or township areas which were run under poorly funded Department of Education and Training or House of Representatives during apartheid. Kreutzer (2009) who noted how the inequalities of access to computers and the internet within the education system indicate how South Africa has failed to achieve redress for the formerly racial basis of resource allocation.

Previous studies at five South African universities have revealed that a large group of millennial generation showed a serious lack of experience and opportunity in using ICTs, this group at the opposite of digital divide have been called “digital strangers” (Czerniewicz, Williams and Brown, 2009). The background of the digital strangers is characterised by very low or non-access at all to the use of technologies such as computers (Czerniewicz and Brown, 2010). The former schools of the students located in disadvantaged communities had no ability to raise fees to improve resources such as computer laboratories (Galpin and Sanders, 2006) or they had the computers but the technology were not prioritised by the

educators (Chigona, 2011; Hardman 2008). Van der Berg (2008) noted how schools in disadvantaged communities often face challenges of lack of resources as well as lack of qualified educators.

Such challenges tend to reduce the opportunities available for learners in the communities to take part in higher education and training (Herselman and Britton, 2002). Whilst some have argued that the uses of ICTs in these disadvantaged schools have the potential of extenuating the challenges (Wintz, 2009; Louv, Muller & Tredoux, 2008). It is clear that if young people fail to engage with new technologies, they risk falling behind their peers in education, and will ultimately suffer in what is increasingly a “technology-dependent” globalised job market (Seale, 2006). Yet, a computer is a complex multi-tasking device, which cannot be compared to simple devices like mobile phones, using the computer and the internet requires specific skills that goes beyond mere ‘push and go’ applications (Korupp and Szydlik, 2005).

To complicate the situation, studies have shown that students from disadvantaged backgrounds were fearful of computers and less positive about their use as a beneficial tool (Brown and Czerniewicz, 2007; Galpin and Sanders, 2006). The negative attitude hinders the students’ use of computers and the internet leading to poor academic performance as students who must make an extra effort to learn computer skills after matriculating are likely to experience long-term academic challenges (Farrell, 2005). While it is important to prepare university students for the information age, real daily dilemmas exist in relation to ICT related decisions which may further disadvantage already disadvantaged students (Brown, Czerniewicz and Pederson, 2008, Brown and Czerniewicz, 2010).

Redress, therefore, remain a burning issue in South African education (Czerniewicz and Brown, 2012) thus digital inclusion is imperative for digital strangers as it enables the creation of gateways, opening of doors and letting people in (Seale, 2006). However, digital inclusion is not a matter of ensuring that all individuals make use of ICTs throughout their day-to-day lives, but a matter of ensuring that all individuals are able to make what could be referred to as ‘smart’ use of ICTs, that is using ICTs as and when appropriate (Seale, 2006).

For many young South Africans who make up the majority of HEIs students, the relatively inexpensive mobile phone handsets are fast becoming the internet platform and multimedia device of their choice – regardless of whether an individual owns a mobile phone with a given feature or merely access it through a friend or family (Kreutzer, 2009). In such a case, HEIs in South Africa have to consider exploiting the success of cellular technology for teaching and learning (Ng’ambi, 2006). The availability of mobile phones in South Africa has

already initiated interest on how the technology can be appropriated for learning (Ford and Botha 2008; van Rooyen 2008).

The socio economic based digital disparity in the macro context of South Africa is mirrored in the students entering HEIs across South Africa in terms of access to computers and the Internet as shown in Fig 1:

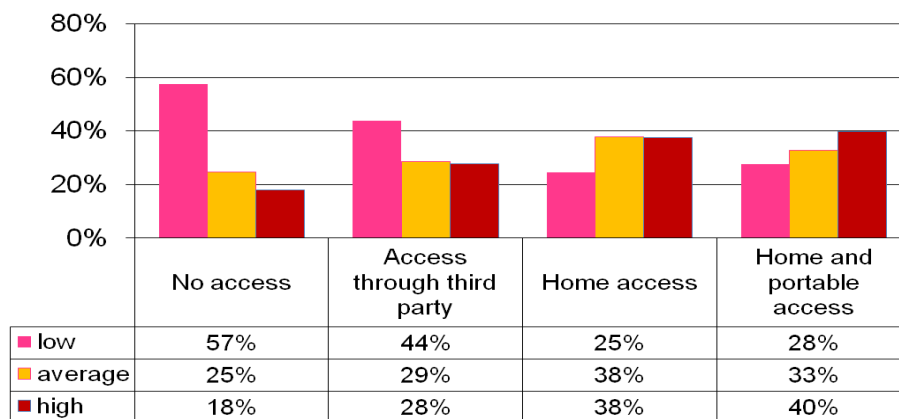


Figure 1: Access by socio-economic group (Brown and Czerniewicz, 2010)

As noted by Czerniewicz, Williams and Brown (2009) in contrast to computer access, cell phone ownership is pervasive and ownership is not socially differentiated. Their study discovered that despite the cost implications and the fact that students from a high socio-economic group have other kinds of access to the Internet, the spread of Internet access via cell phone is remarkably even across socio economic groups.

Mobile phones are therefore poised to play a major role as a digital inclusion tool and in the stimulation of the information society and can be seen as the most important networked knowledge exchange technology used in Africa (Ford and Botha, 2003). Unfortunately, most educators still view the computer and the cell phone as unrelated devices, and the tiny cell phone more as a personal accessory, especially for young people (Librero, Ramos and Ranga, 2007). Cell phones, however, have the potential to improve education for the millions of underprivileged users in the developing world (Kumar, Tewari, Shroff, Chittamuri, Kamand and Canny, 2010). A study of the use of ICTs by students from constrained environments showed that students used their cell phones for academic purposes (Czerniewicz, Williams and Brown, 2009).

Getting a university degree remains a huge challenge for many South African students; especially those who do not have money for textbooks and laptops, so students have become creative about closing the technology gap with the help of their phones (Howard,

2012). The mobile internet has especially increased the value of the mobile phone for learning purposes. According to Brown, Czerniewicz and Pederson (2008) cell phones were the main means of access to the internet off campus by students from low socio-economic groups. Furthermore, many see mobile internet as a way of providing for those who cannot afford the traditional means of accessing the Internet. Fig 2 shows that most disadvantaged students use mobile phones to access the internet.

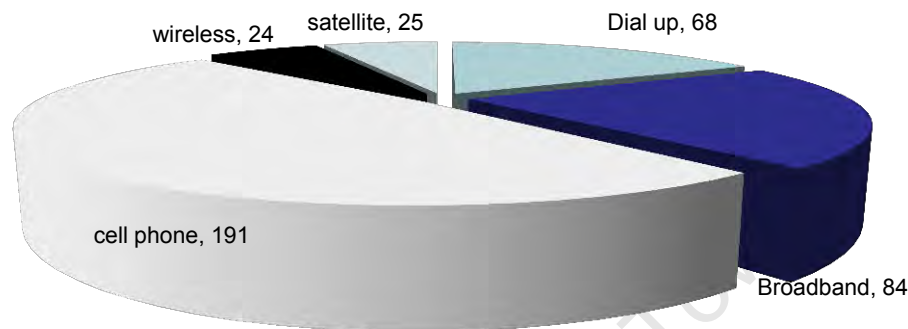


Figure 2: Type of Internet access for low socio-economic group students (Brown and Ng'ambi, 2012)

## 2.4 Science and technology in South Africa

Science and technology have been the backbone of development in many countries as they are considered to be the intellectual engine of economic development (Kotecha, 1996). It is argued that most countries with the highest rates of economic development have invested in human resources development through education, for example tiger economies of East Asia (Taiwan, Hong Kong, Korea and Singapore) and the newly industrializing countries (Malaysia, Thailand and the Philippines) (Kotecha, 1996). In South Africa, the “Facing the Facts” study warned that well trained, effective scientists, engineers and technologists are critical to the country’s future (NACI<sup>1</sup> and DST<sup>2</sup>, 2004). The NARSET report of 1996 reported that during that period 80% of South Africa’s human resources in the science and technology fields were white. The report attributed these distortions to the failure of the educational system to initiate strategies of redress in the sector. As a result, du Toit and Roodt (2009) noted how South African tertiary institutions are under pressure from the government to radically increase the number of graduates in the fields of science and engineering.

To initiate the growth of science and technology, the South African Higher Education sector has been steered by government through policies that direct processes and procedures

<sup>1</sup> [www.nstf.org.za](http://www.nstf.org.za)

<sup>2</sup> [www.dst.gov.za](http://www.dst.gov.za)

in the sector. The Department of Education has come up with The White Paper (1997) and which focuses on widening of access. Kotecha (1996) reports that there has been higher subsidy from government to prompt universities to increase science graduate output. Jacobs (2010) also noted that the government subsidy granted for students to study Sciences is proportionally higher than for studies in Education, Humanities or Law whereas expenses pertaining to these programs are reflected by a reimbursement from government.

According to Jacobs (2010), the importance of Science as a national asset cannot be denied as Natural and related Sciences provide the country with medical doctors, engineers, scientists and farmers. The government has therefore promoted the identification of Science competency as a scarce skill (Department of Education, 1997) and the national need to train scientists, engineers and other related professionals. According to Department of Education (2003) policy, universities are obliged to manage enrolments in Science and ensure successful throughput as Science fields (Natural Sciences, Engineering, Mathematical Sciences, Health Sciences, IT and Agricultural Sciences) have been placed in a higher bracket for earning government funding. A great number of policy processes and documents in the fields of education and training, higher education and technology have a bearing on the context surrounding the provision of more and better quality Science, Engineering and Technology graduates (NARSET, 1996).

With the knowledge that there is a problem with respect to a lack of human resources in science and technology in South Africa, the government and HEIs realised the need to increase access to higher education in the fields of science, engineering and technology to students from disadvantaged educational backgrounds and to improve the retention rates of such students once they have gained access to higher education (Kotecha, 1996). However, as highlighted by Jacobs (2010), access into studies in Science and other related disciplines, all rely primarily on school performance in Mathematics and Physical Science, in turn, Grade 12-results depend on the quality of teaching, commitment of the teacher and the learning attitude and environment created within schools.

Nonetheless, the legacy of apartheid is visible in inequalities in the distribution of resources, opportunities provided to learners and the quality of teachers in rural areas and former black townships (Matoti & Lekhu 2008:126-142). Matoti and Lekhu (2008) noted how many of these inequalities have not been eradicated, and that there are still schools where learners are not provided with opportunities to pursue further studies, where teachers teach under trees, often without electricity, running water or sanitation. Thus the lack of qualified teachers creates greater problems especially in the science field as the output of

secondary schools barely matches university standards. According to Rademeyer (2009:396) in 2004, there were 27 000 public schools in the country, with 17 985 qualified Mathematics teachers. These statistics indicate that there are proportionally 0.67 qualified Mathematics teachers per school.

Such statistics reveal the ill preparedness of students from disadvantaged background for science related programs as they enter universities. Jacobs (2010) noted the high failure rate of students in Science, Engineering and Health Sciences and the perceived under-preparedness of first-year students who enter universities in South Africa. HEIs, however, have responded to the problem of the paucity of science and technology graduates from educationally disadvantaged backgrounds by initiating various strategies which include:

- Selection programs, with active testing designed to identify science and technology potential rather than prior learning, since matriculation marks have generally been found to be poor predictors of success.
- Bridging programs, which attempt to make up the content knowledge lacking by science students from disadvantaged educational background in the space of a year before such students participate in the normal degree programme.
- Augmented or extended programs, in which the first year of a degree programme is spread over two years, with some development oriented courses included.
- Foundation programs, which concentrate not only on content but on academic literacy, theories of learning, processes of studying and knowledge construction, and which included a counseling component to prepare students adequately for normal academic study.
- Adjusted mainstream curriculum, teaching and learning in the undergraduate programs, while maintaining exit levels of proficiency. [NARSET Report, 1996]

This study is thus, situated in a bridging program in the Academic Development Program at UCT specifically a science bridging program: General Entry Program in Sciences (GEPS).

## **2.5 Gender and sciences**

Gender is a social construction; it concerns the differing qualities culturally attributed to women and men (Oakley, 1972). According to Acker (1983) sociologists have often failed to recognise that sex difference is the result of cultural and social influences. Thomas (1990) noted how theories of gender and education have to some extent mirrored those on class and education. Other authorities believe that inequality is caused by the differential socialisation

of girls and boys (in the sense that girls are culturally deprived) and that this can be overcome through removing prejudice whilst others believe that schools both reflect and reproduce patriarchal relations (Mahony, 1985; Spender, 1982).

Few girls take physical science subjects and few boys take languages, and it has been argued that reducing the imbalances is an important step in reducing inequality (Thomas, 1990). Evidence shows men have slightly better cognitive skills (mental rotation, disembedding figures, and field independence) than women and that, among adolescents, males have higher self-esteem and more interest in science than females. There is also evidence supporting sexually differentiated brains at birth, partially due to hormonal activity, but further studies show the human brain is also open to modification by experience (Eisner (1996). Oldham (2000) on the other hand argues that research has generally supported the conclusion that there are no biological, neurological, or genetic factors at work in the creation of scientific gender disparity, rather, a combination of elements including social stigma of the sciences as “masculine”, institutional bias in the scientific community, and pressures related to starting a family combine to make it more difficult for women to train for and maintain a high-achieving scientific career.

Whilst there has been a great movement to encourage equality in science subjects by organizations such as the United Nations Commission on Science and Technology for Development, the number of female students entering into science related programs has been low. Thomas (1990) argues that it is important to stress that students’ decision to study science was not merely a consequence of their preferring it to other subjects, or being good at it but the result of schooling and family influences. She noted that whilst personal inclinations are very important, they often arise from having been taught by an exceptional teacher or having a scientist parent who help with homework. This study shows that female students from disadvantaged backgrounds are rarely raised by educated parents let alone parents with scientific backgrounds and yet they make it to higher education out of sheer will and determination besides the bias attached not only to them being girl children and also of sciences being masculine subjects.

Oldham (2000) advocates for the encouragement of sciences for women for the following summarised reasons:

- **Human rights and social justice.** All individuals should have equality of opportunity to a science education and to a scientific career, and for women and men to benefit equally from advances in science and technology.

- **Scientific and economic reasons.** If women are not given equal opportunity to become scientists and engineers then a country denies itself its full complement of scientifically creative minds. This can be a serious handicap both to the development of science and to the generation of wealth in an increasingly competitive world.
- **Social reasons.** Women frequently perform different roles and tasks both within and outside the home to those performed by men. It is important that both men and women are able to bring a scientific and technical education to bear on the performance of these roles and tasks.
- **Reasons of insight.** Some women, it has been suggested, bring different insights, values, motivations and methods of work to their scientific jobs than most men and other women. The inclusion of more women in science will enrich the total pool of talents, insights and motivations, and increase the probability that science will serve the needs of all humanity.

In the South African context, whilst the lobbying for equal opportunities in sciences is fundamental (Jacobs, 2010) the status of the schools in which students attend high school plays a major role. Science studies require laboratories, expensive equipment and well qualified educators, technicians as well as continuous money as well as institutional resources (Jacobs, 2010). Students from disadvantaged backgrounds are coming from ill equipped high school laboratories which do not prepare them to study science at university level. This and the prejudice and bias of girls in sciences complicate the chances of science female students to succeed in the science field.

According to the Council for Higher Education (2010) Higher Education South Africa (HESA) which is an association of heads of public Higher Education Institutions, whose membership and participation is voluntary, aims to improve access to higher education as well as improve the chances of success for students from disadvantaged backgrounds and for science and technology courses, as well as the percentage increases of African and female students. The association have various interventions made by the universities – in the form of bridging courses, access courses and extended programmes to support students from disadvantaged backgrounds.<sup>3</sup> As a result, a number of female science students find themselves in HEIs where they are faced not only by a challenging academic field but a computer based learning environment.

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<sup>3</sup> <http://www.pmg.org.za>

## 2.6 Gendered use of ICTs

The study looks specifically at the use of mobile phones by female students at a HEI in South Africa. The emphasis on female students is not random but is justified by the cultural factors and the socialization of the girl child in sub-Saharan Africa. It is, therefore, essential to elaborate on the gendered use of ICTs in sub-Saharan Africa for this study.

Whilst (ICTs) hold great promise in the drive for development and poverty reduction in developing countries, the social context in which ICTs are expected to operate, ‘can deepen and solidify existing economic, political and social inequalities’ (McNamara 2003: 75). McNamara (2003) also noted that whilst the application of ICTs (e.g. internet and mobile phones) is often similar, their specific social and cultural impact varies as these technologies are influenced by particular cultural traditions, power structures and economic resources. Sub-Saharan Africa is a region with deep seated cultural marginalization of women and a gender gap exists in education that increases in severity with each level of education, the Sub-Saharan Africa Regional Forum on Education for All in 1999 stated that girls represented 56% of the estimated 41 million primary level children out of school (Unesco, 2000)<sup>4</sup>. World Bank figures from 1993 indicate that the number of girls entering primary school in Africa is 2/3 the number of boys, of these, and only 30% complete primary education, in comparison to approximately 60% of boys, the number of girls entering secondary school is less than half the number of boys, and half as many girls as boys complete their secondary education (Derbyshire, 2003).

In those parts of the continent where computer penetration has improved in public or government schools; ICTs have perpetuated the marginalisation of girls as differences in access were soon identified (Derbyshire, 2003). Research indicated that boys spent more time than girls in front of computers both during lessons and during free time and more boys had access to a computer at home and they used computers more often in their leisure time (Volman and van Eck, 2002). The World Links which provides computers, internet connection and training to secondary school students and teachers in 12 countries in Sub-Saharan Africa, carried a case study on gender issues in the use of computers in schools in Africa and identified the same phenomenon (Kozma, McGhee, Quellmalz and Zalles, 2004).

Women’s rights groups working in rural areas point to how access to household assets is affected by gender, if the household has one radio, it is most likely to be used by men; women may not have the leisure to listen to the radio, nor may be allowed to join the men

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<sup>4</sup> <http://www.unesco.org>

sitting outside the house listening to the radio (Gurumurthy, 2004). In Uganda, girls did not get access to the limited number of computers installed in school (under a World Links Program) because of the socio-cultural norm that “girls do not run”. As a result, boys ran and got to the computers first and refused to give them up to girls. Various other studies show that especially in rural Africa mobile phones, computers and the Internet are used predominantly by men (Gillward and Essler, 2005).

In terms of higher education training, girls are encouraged to take any job or get married rather than seek higher qualifications (Hafkin and Taggart, 2001). Thus, even at HEIs men and women structure their masculinities and femininities according to their contexts, their class, their age and their ethnic and religious background (Mbambo-Thatha, Mlambo and Mwatsiya, 2009). Accordingly, as highlighted by Ndlovu (2001) female students struggle, sometimes unsuccessfully to have access to facilities such as the cafeterias, the sports facilities, the library and other common services on a basis equal to that of male students on university campuses.

Gender studies at HEIs, therefore show young males as the main users of ICTs especially the computer, Internet and e-mail (Johnson, 2009; Payton, White and Mbarika, 2005), suggesting a gap between discourse and the reality of women empowerment (Macueve, Mandlate, Ginger, Gaster, Macome, 2009). This is reflected by the findings of Morrith (1997) who interviewed nine professional women in her study of their use of, and experience with, computer-based technologies. She recommended equal access to computers for females in their earliest learning, as she found that there was “a great rift between girls who have computer skills and those who do not which would lead to the division of society into stratified classes based on the criteria of computer literacy” (p. 156). Madanda, Kabbose and Bartebya-Kuyamhendo (2007) noted how women at HEIS have their number decreasing with increasing skills complexity as they face cultural and social barriers to acquire access, and lack time to learn and use ICTs.

Previous studies in South African universities have shown male students autonomy and confidence in using ICTs compared to their female counterparts (Brown and Czerniewicz, 2007). Overall, the gender divide is seen mainly in terms of the ways that females are disadvantaged relative to males. At the output level, results indicate that females know less about ICT, enjoy using the computer less than male students and perceive more technology problems (Jansen and Plomp, 1997). However, there seem to be no gender difference in the ownership and use of mobile phones by young people who make up majority of students in HEIs (Kreutzer, 2009; Goode, 2010). Best and Maier (2007) noted

how gender biases are notoriously deep-seated and argued for the significance of an awareness of the gender dimension of new technologies which is particularly important for women's empowerment.

While very few studies on the gender divide have been undertaken in developing countries especially in higher education (Czerniewicz and Jaffer, 2007), a South African study noted that while male and female staff and students had the same access to technological resources, differences in autonomy between male and female were apparent (Brown and Czerniewicz, 2007). Czerniewicz and Jaffer (2007) report on a study by the Link Centre based on the 2004 and 2005 data of 10 African countries which showed that in less developed African countries and contexts (i.e. rural settings) mobile phones, computers and the internet were used predominantly by men, but in more economically developed countries like Botswana, Namibia and South Africa the gender splits were mostly equitable in terms of uses of mobile phones.

## **2.7 Informal learning**

The first year of study can prove particularly challenging for students entering university as they settle into the new learning environment and begin to understand what is required of them (Hatt and Baxter 2003; Yorke 2005). Students from disadvantaged backgrounds may experience particular difficulties in their transition into university because of their different skills, experiences and expectations compared with advantaged students (Walker, Matthew, and Black 2004). The degree of responsibility that students are expected to take for their own learning can prove surprising and difficult to adjust to, particularly where it is contrary to previous educational experiences (Leathwood and O'Connell 2003; Sambell and Hubbard 2004). The use of computers for learning may intensify the problems that first year science female students from disadvantaged background face as new students at big institutions. To cope in the highly demanding environment students have to adopt survival skills.

Informal learning provides a simple contrast to formal learning or training that suggests greater freedom for learners as it recognizes the social significance of learning from other people, but implies greater scope for individual agency than socialization (Eraut, 2004). It draws attention to the learning that takes place in the spaces surrounding activities and events with a more overt formal purpose, and takes place in a much wider variety of settings than formal education or training (Eraut, 2004). According to Marsick and Watkins (2001) whilst, formal learning is typically institutionally sponsored, classroom-based, and highly structured, informal learning is a category that includes incidental learning, and may occur in institutions, but it is not typically classroom-based or highly structured, and control of

learning rests primarily in the hands of the learner. Thus, informal learning is learner driven and intentional. Informal learning can, therefore, be said to occur, wherever there is need, motivation, and opportunity for learning. After a review of several studies done on informal studies Marsick, Volpe and Watkins (1999) concluded that informal learning can be characterized as follows:

- It is integrated with daily routines.
- It is triggered by an internal or external jolt.
- It is not highly conscious.
- It is haphazard and influenced by chance.
- It is an inductive process of reflection and action.
- It is linked to learning of others [p. 5].

Eraut (2004) argues that the characteristics of the informal end of the continuum of formality include implicit, unintended, opportunistic and unstructured learning and the absence of a teacher. As shown in Table 1, he distinguishes between three levels of informal learning intentions; *implicit, reactive and deliberative* learning.

The columns in Table 1 distinguish between three levels of intention. *Implicit* learning is defined by Reber (1993) as ‘the acquisition of knowledge independently of conscious attempts to learn and in the absence of explicit knowledge about what was learned’. Eraut (2004) argues that most learning from experience has some implicit aspects, and that awareness of explicit learning does not mean that implicit learning is not also taking place.

Time of focus	Implicit learning	Reactive learning	Deliberative learning
Past episode(s)	Implicit linkage of past memories with current experience	Brief near-spontaneous reaction on past episodes, events, incidents, experiences	Discussion and review of past actions, communications, events, experiences
Current experience	A selection from experience enters episodic memory	Noting facts, ideas, opinions, impressions; asking questions; observing effects of actions	Engagement in decision making, problem solving, planned informal learning
Future behavior	Unconscious Expectations	Recognition of possible future learning opportunities	Planning learning opportunities; rehearsing for future events

Table 1: A typology of informal learning (Eraut, 2004: 250)

As shown in Table 1, Eraut (2004) further argue that, outside formal education and training settings, explicit learning is often unplanned; hence he makes a distinction between *reactive* or *opportunistic* learning that is near-spontaneous and *deliberative* learning that is more considered. He used the term ‘*reactive learning*’ because, although it is intentional, it occurs

in the middle of the action, when there is little time to think. In contrast, *deliberative* learning includes both '*deliberate*' learning (Tough, 1971), where there is a definite learning goal and time is set aside for acquiring new knowledge, and engagement in deliberative activities such as planning and problem solving, for which there is a clear work-based goal with learning as a probable by-product.

In this study, informal learning by first year female students might involve all three levels of informal learning intentions; implicit, reactive and deliberative learning in the three time focuses in Table 1 as they negotiate their way into a new academic experience. Informal learning is therefore, realistic in the context of this study because it is unplanned, linear, applied, contextualized and therefore limited (meaning it ceases when the learner perceives that the task is completed rather than when the teacher determines) but highly social, in the sense that an individual seeks help from others (Rogers, 2006). The ubiquitous nature of the mobile phone makes it an appropriate tool to support this type of learning.

## **2.8 Affective learning**

According to Krathwohl, Bloom and Masia (1973) the affective domain includes the manner in which we deal with things emotionally such as feelings, values, appreciation, enthusiasm, motivations and attitudes. Thus affective learning outcomes involve attitudes motivation and values and the expression of these often involves statements of opinion and beliefs of an assessment of worth (Smith and Ragan, 1999). According to Trooman (n.d.) the objectives of affective learning are typically oriented towards participants' feelings and they are often difficult to measure in quantifiable terms, however it is important that students appreciate what they are learning or 'feel good' about themselves whilst in a learning context.

Cacioppo and Gardner (1999) noted that educators know through their own empirical practice that learning occurs more often and to a greater degree, when participants are involved emotionally and research in neuro-biology supports this connection. Trooman (n.d.) also argues that without emotional stimuli in the affective dimension learners become bored and may abdicate from sustained learning endeavours. Mezirow (1990) purports that transformations change or perspective transformation is the process of making meaning of one's perspective as a result of one's endeavour of affective learning. Thus as noted by Trooman (n.d.) in order for the transformational change to occur, there is need for reflection which leads to adjustments of learners meaning perspective, incorporating new ideas, thoughts, feelings and values. Therefore Trooman (n.d.) argues that in the process emotions and feelings play a significant role in learning and meaning making,

According to Mezirow (1990) for affective dimension to be successful, there is need for ideal learning conditions which are:

- an environment which promotes a sense of safety, openness and trust.
- instructional methods that support a learner-centred approach
- activities that encourage the exploration of alternative personal perspective problem posing and critical reflection

Cranton (1996) also purports that there must be a democratic environment in which people respect and listen to each other.

Wlodowski (1985) disserted affective responses in the learning environments into four areas:

1. emotions influenced by the learners' mood
2. the influence of the instructor
3. reactions influenced by the learning process and materials
4. learner emotional response to the learning group.

Trooman (n.d.) noted that affective learning is in many ways a highly personal endeavour for each participant, the result, which is often a great sense of belonging in relation with others. She argues that as learners reflect personally, they validate their reflection socially thereby creating lasting meaning. As noted by Wlodowski (1985) feeling friendship in a group with the opportunity to share emotions and experiences is extremely nurturing and beneficial to people's psychological health.

Thus, the use of mobile phone to support affective learning in this study would enable the science female student to succeed in an intellectually demanding field.

## **2.8 Chapter Summary**

This chapter looked at the literature around ICTs in developing context. Literature shows that whilst there is unequal access and use of ICTs in Africa, mobile phones can provide unlimited opportunities for the large number of people who remain unconnected in terms of computers and the internet. The gendered use of ICTs was also examined which shows how females are segregated in the use of ICTs in Sub-Saharan Africa. Although higher education's institutions seem to promote computerised learning instead of mobile learning despite the growth of the latter in Africa, studies show that the use of mobile phones in universities is neither socially differentiated nor gender related.

The chapter also looked at the need for science graduates in South Africa and the domination of men in sciences in Sub-Saharan Africa and South Africa in particular.

Informal learning and affective learning and their characteristics are examined, particularly how these types of learning can be supported through affordances provided by the mobile phone.

The next chapter, Chapter 3 looks at the theoretical framework of the study, which is the critical theory. Critical theory brings to the fore the emancipation and empowerment aspect of this study provided by the use of a tool that is familiar to disadvantaged students for learning. Critical Discourse Analysis (CDA) is also explained and elaborated upon as a lens through which this study is analysed.

University of Cape Town

## Chapter 3

### Theoretical and Analytical Frameworks

#### 3.0 Introduction

This chapter discusses the theoretical perspective underpinning the study. The first part explores the critical theory framework before moving on to the analytical framework of the study, which is Critical Discourse Analysis.

#### 3.1 Theoretical framework: Critical theory

This study is grounded on the critical social theory; the theory goes back to the theoretical tradition developed by a group of writers at the Frankfurt School in the 1960's (Kincheleo and MacLaren, 1994). According to Zou and Trueba (1998), a critical social theory is concerned with issues of power and justice and the ways that the economy, matters of race, class, gender, ideologies, discourse, education, religion and cultural dynamics interact to construct a social system. Critical theory analyses competing power interest between groups and individuals within a society, identifying who gains and who loses in specific situations (Horkheimer, 1972). In this study, the competing powers would be the imposing of computer based learning by HEIs which benefits elite students at the expense of students from disadvantaged backgrounds. As argued by Kincheleo and MacLaren (1994) privileged groups often have an interest in supporting the status quo to protect their advantages, the dynamics of such then often become a central focus of critical research.

Thus:

*“Critical theory and critical educational research have substantive agenda mainly for examining and interrogating the relationship between schools and society – how schools perpetuate or reduce inequality, the social construction of knowledge and curricula, who defines worthwhile knowledge, what ideological interests this serves, and how this reproduces inequality in society, how power is produced and reproduced through education; whose interest are served by education and how legitimate these are for example: rich, white, middle class males rather than poor, non-white females” (Cohen, Manion and Morrison 2007:58 ).*

HEIs by foregrounding computer based learning are perpetuating the inequality of disadvantaged female students, critical theory, thus, questions the ideological interests of such thinking as well as the resulting production and reproduction of power. This study, however, also focuses on the emancipation and empowerment of disadvantaged female students since Cecez-Kecmanovic (2005) argues that the critical theoretic orientation generally means framing the purpose of research in the context of critical theoretical concerns such as domination, power, and control on one hand and liberation, empowerment on the other. Hence critical theory focuses on the productive aspects of power, its ability to

empower, to establish a critical democracy and to engage marginalized people in the rethinking of their socio-political roles (Fiske in Kincheleo and MacLaren, 1994). Whilst these students might be dominated and powerless as far as the use of computers is concerned, mobile phones are liberating and empowering tools enabling them to do what they cannot yet do with computers.

The concentration on “disadvantaged” and “female students” and the technological tool familiar and usable to them emphasize the marginalized nature of the study and calls for critical research since:

*“Critical social research is oriented towards challenging rather than confirming that which is established, disrupting rather than reproducing cultural traditions and conventions, opening up and showing tensions in language use rather than taking surface consensus as a point of departure. The intention is thereby to contribute to emancipation, for example, to encourage rethinking and the emotional as well as cognitive working through of ideas and identities which are repressive. Alternatively and less optimistically, the enterprise may be seen as one of fuelling resistance to those powers defining who we are, what we should be and aspire to and how we should live our lives as normal and well-adjusted persons”* (Alvesson and Deetz, 2000:9).

In other words critical research challenges the status quo and calls for transformation to the world-actors, information systems, organizations and society including their dynamic, complex and emergent interrelationships (Cecez-Kecmanovic, 2005). By bringing to the fore the use of mobile phones for learning by disadvantaged female students in a computer based environment, the study will capitalize on the task of critical theory which is to penetrate the world of ‘things’ and show the underlying relations between persons (Horkheimer,1972). This study therefore seeks to highlight the importance of mobile phones as a digital empowering tool in a developing context marked by huge socio-economic disparities.

### **3.1.2 Habermas and Critical theory**

Habermas created a model in which reality is constituted through his cognitive interests’ theory, divided into the technical, the practical and the emancipatory (Roderick, 1986). What Habermas calls cognitive interests are the general or orientations or strategies that guide how people acquire and use knowledge to pursue their interest in all walks of life, including their occupations (Mingers and Willcocks, 2004). Whilst the technical cognitive interest is more positive paradigm oriented, and the practical cognitive interest rests more on the interpretive paradigm, it is the emancipatory cognitive interest that incorporates a critically oriented approach (McCarthy, 1978). Emancipation is the process through which we as humans individually or collectively remove obstacles standing in the way of achieving freedom to a greater or lesser degree meaning more people can achieve their potential (Mingers and Willcocks, 2004).

The emancipatory cognitive interest is therefore, oriented towards revealing and overcoming internal and external compulsion, which often appear as seemingly natural constraints, when in fact they are the result of social forms of domination (Mingers and Willcocks, 2004). Of note is how Habermas positions the power of emancipation on the oppressed individual or group of people, Mingers and Willcocks (2004) noted how it is the citizens themselves who have to overcome the current ills of society. The emancipatory cognitive interest therefore aims to secure freedom from self-imposed constraints, hypothesized forces and conditions of distorted communication; the interest is therefore based in the human capacity to act rationally, to be self-determining and self-reflective (Roderick, 1986).

The human capacity to reflect on our own development, and thus to act to a greater consciousness and autonomy, is the basis upon which the emancipatory interest can be revealed (Roderick, 1986). The capacity of disadvantaged female students in this study to recognize and use the technological tool that is familiar to them for learning rather than the one imposed on them, shows the emancipatory nature of the study.

### **3.2 Analytical tool: Critical Discourse Analysis**

To unpack the ideology, domination, power, emancipation and identity concepts in this research, Critical Discourse Analysis (CDA) is going to be used as an analytical tool to enact the critical theory paradigm of the study. Kincheleo and MacLaren (1994) noted how critical researchers have come to understand that language is not a mirror of society, it is an unstable entity that finds its meaning shifting depending on the context in which it is used. Accordingly Rogers, Malancharuvil-Berkes, Mosley, Hui and Joseph, (2005) argue that facts are never neutral and are always embedded in contexts, some groups of people in society are more privileged than others, and these privileges lead to differential access to service goods, and outcomes. CDA therefore refers to how people talk and interact the way they do in their daily lives, it means understanding the relationship between talk, interaction and powers (Rogers, 2004). In other words, the way people talk is informed by where they come from, that is the society in which they belong. In this study the first year female students from disadvantaged backgrounds way of talk would be influenced by the socio-cultural and socio-economic beliefs of their backgrounds. CDA allows one to understand, uncover and possibly transform conditions of inequality for this particular group of students (Rogers et.al, 2005).

Statements made in conversations and written in texts are not as simple as they seem, they are derived from broader social domains. CDA then endeavors to make explicit power relations, which are frequently hidden in order to derive results which are of practical

relevance (Wodak and Myers, 2001). CDA is therefore, a type of analytical discourse research that primarily studies the way social power abuse; dominance and inequality are enacted, reproduced and resisted by text, talk in the social and political context. In such dissident research, critical discourse analysts take explicit position, and thus want to understand, expose and ultimately to resist social inequality (van Dijk, 1993).

Discourse is further facilitated by shared assumptions, cultural cues and values of a group of people (Fairclough, 1995). In this study, the discourse will be the shared assumptions, cultural cues and values of first year female students from disadvantaged backgrounds. Consequently, discourse normally refers to a group of people (in this case; disadvantaged first year female students) who are familiar with a particular subject (sciences) or idea: who might live in secluded areas but still share the same world view (Taiwo, 2010). The conversations, text and the meaning behind the disadvantaged first year female students are then called a discourse.

As argued by Fairclough (1995) in using language as discourse and as a social practice, one is committing oneself not just to analysing texts, nor just to analysing the process of production and interpretation, but to analysing the relationship between texts, processes and their social conditions, both the immediate conditions and the situational contexts and the more remote conditions of institutional and social structures. Thus language use, discourse, verbal interaction and communication belong to the micro-level of the social order, whilst power, dominance and inequality between social groups are typically terms that belong to the macro level of analysis (van Dijk, 1993).

Gee (1996,1998) assumes that meaning, a system of creative and generative, yet structured possibilities is linked through to what he refers to as “d” and “D” discourse. Little “d” discourse is language bits or words we use, “D” discourse involves the way of believing, representing, acting, performing and valuing that comprise what it means to be a “competent” user of language in particular discursive contexts (Rogers et al., 2005). For example, there is a university Discourse that includes certain language bits that may be particular to academia, and there are also associated ways of thinking, believing and valuing that are connected with membership in the Discourse of the university (Rogers, 2004). Big D Discourse therefore refers to identity; not individual identity but group identity- a way that an individual thinks, speaks and acts that is recognized by others in relation to the social world (Brown, 2011).

In this study, Gees notion of discourse is going to be used, since as noted by Rogers et al. (2005) the language bits (little d discourse) and the social cultural models (big D Discourse) are constitutive and work together to construct, maintain and transform

interactions. The distinction between the two will help to unpack and analyze the use of technology by disadvantaged first year science female students at university. Rogers et al. (2005) further argue that the most important thing to keep in mind about Discourse (both big and little d) is that they are social and political and have histories of participation that are saturated by power relations. Thus, discourse simultaneously constitutes social identities, social relations and systems of belief which in turn determine it (Halliday in Fairclough, 1995:73).

Another useful concept that Gee (2005) terms “Big C” Conversations is important in uncovering themes, debates or motifs that have been the focus of much talk and writing in some social groups with which are familiar in society as a whole. Gee (2005), therefore views Big C Conversations as grand societal conversations. As elaborated by Brown (2011), Gee terms these Big C Conversations explicitly as tools of inquiry to examine what Conversations a piece of texts refers to and what it does not; how these impinge on what people are saying and what others take this to mean, and how they are shaping the discourse. Thus, thinking about the different Conversations a piece of language impinges on or relates to is another tool for engaging in discourse analysis (Gee, 2005:22).

Setting the background of the students under study as well as the institution they find themselves in is important. Wodak (1996) noted that discourse is not produce and cannot be understood without taking context into consideration. Brown (2011) noted that context is central to CDA, and it can constitute an important methodological consideration of framing discourse in particular selections of context, the relevance that is established by the researcher but made into an object of observation. Context can be defined far more broadly as Wodak experienced in her study of therapeutic discourse where data was not restricted to specific discourse sequence, but included all the verbal and non-verbal actions in the therapeutic group (Wodak and Myer, 2001).

CDA becomes of paramount importance in this study as Deetz (1985) is of the view that of all institutional forms, language has a special position, all other institutional forms may be translated into language... and talk and language are much more the means of expression of individual meanings, they connect each perception to a larger orientation and systems of meaning. Kwaramba (1997) notes that language is understood as a product of, and a resource in shaping social relationship, thus language has a dialectical relationship with social structure. She further argues that critical analysis of language in texts can provide an effective method of study of ideological processes and relationship of power and control, for it is through language that different social groups seek to produce and reproduce power

structures, and to either dominate or liberate themselves, which is exactly what this study seeks to illuminate.

### **3.2.1 Context, meaning identity and power**

According to Brown (2011), identity and meaning are essential in understanding how new technologies are appropriated; she noted how context is necessary to examine the system as a whole and how issues of power surface, influencing possibilities within the contexts actors operate within. Avgerou and Madon (2004) argued for the need to understand new technologies (internet and mobile phones) which is only possible if we consider their symbolic meaning in everyday life. As noted by Cushman and McLean (2008) the most important thing is not just how the technology is adopted but how it is integrated into people's lives. The context in which the technological tool is being used becomes important, (in this case the mobile phone) especially in the developing country context (Avgerou and Madon, 2004).

In this study the context, meaning, identity and power are crucial for the understanding of the use of mobile phones by female students from disadvantaged backgrounds.

#### **3.2.1.1 Context**

According to Gee (2005) contexts refers to the ever-widening set of factors that accompany the use of language. Therefore context is a crucial methodological and theoretical issue within CDA as it comes in various shapes and sizes and operates at different levels from very small to very big (Blommaert, 2005). According to Fairclough (2006) discourse is a moment of the social process that is interconnected with other moments in a fluid kind of way. Thus language influences what we take as the context and the context influences what the utterance is interpreted to mean, leading to situated meaning (Gee, 2008). Foucault (1969) roots discourse as a historical product in which regard Gee (2008) argued that it is not individuals who speak and act but rather that historically and socially defined Discourses speak to each other through individuals. Gee further argued that the individual instantiates and gives body to a Discourse every time he or she speaks or acts, thus carrying it and ultimately changing it through time. Brown (2011) deduced that discourses are, therefore, systematically-organized sets of statements that give expression to the values and meanings of an institution (context) and that beyond that they define, describe, and delimit what is possible to say and not to say (what to do and what not to do) with respect to the area of concern of that institution.

### 3.2.1.2 Meaning

According to Gee (2004, 2005) in discourse analysis there is a relationship between forms, which are the hard structures of the linguistic system (i.e. nouns verbs, adverbs and adjectives) and the function which are the soft structures (i.e. the communicative purpose) which Gee phrases as the '*meaning potential*'. Gee (2004) terms the relationship between form and function as "*utterance-type meaning*", and adds an additional layer especially where situated meaning takes a specific meaning in a context of use, which he termed "*utterance token meaning*" or "*situated meaning*"

In relation to the meaning of language Gee (2005) purports that words have meaning in relation to choices by speakers and writers and guesses by hearers and readers, about other words and assumptions about context. Gee (2005) proposes key concepts in meaning and context: the first is the *exclusion principle*, which occurs when a person uses a word with the intention to include certain concepts and exclude others. Another principle according to Gee (2005) is the *guessing principle*, which implies that we can only make good guesses about meaning by considering the context of the communication. Thus context is very important in discourse analysis as Gee (2005) is of the view that language and context in most contemporary discourse analyses are usually reflexive, which means that utterances (what we say/write) influences what we take to be the context and our context influences what we say.

As noted by Brown (2011) in situated-meaning tasks the issue of validity involves the frame problem, as context is indefinitely large and no matter how much context we consider in offering an interpretation of the text, there is always a chance that additional aspects or new considerations could change the interpretation. However, Brown (2011) suggested that to deal with the problem there is need to offer arguments that aspects of the context were well considered, and are important and relevant to the subjects of the research, and for analytical purposes of the researcher.

### 3.2.1.3 Identity

As noted by Gee (1996) discourses are acquired through enculturation into a social practice and they cannot be taught. Each community or social group, therefore, masters a home based discourse that integrates words, actions, values, feelings, attitude and thinking in specific and distinctive ways (Brown, 2011). Gee (1996) points out that each of these discourses is connected to a particular social group's way of being in the world, its "form of life" its very identity it regard itself as having. Although membership of an identity group does not

determine behavior, there is an ease with which people readily accept the social groupings imposed on them (Foucault, 1994).

According to Goode (2010), in ICTs studies, examining technological identity provides a useful perspective of the digital divide as it places the unit of analysis at the level of the individual. She argues that viewing identities as a product of participation in communities (i.e. as contextually specific) can strengthen our investigation of how computing experiences influences an individual's relationship with technology.

#### **3.2.1.4 Power**

According to Hindess (1996) at individual level, there are three core views:

- The first view of power is as a capacity to act, where people use power with things and with other people, though there is an unequal relationship between those who use power for their own purposes and those who are subject to its effect: and power is used as an instrument of domination.
- The second view of power is where the subjugated are covertly excluded from decision making structures and whilst they might be raising some voices, their voices are not heard.
- The third view of power is where the subjugated are compliant in their powerlessness, and they fail to recognize that their interests are at risk or not making any attempts to defend these interests.

Brown (2011) noted how social stratification is the overall creation and distribution of power in society. Foucault (1994) views power as something exercised over those who are in a position to choose, although power influences what those choices will be. Foucault, therefore, separates power and domination, where power is a “strategic game between liberties” where people can engage in the exercise of power on their own account- i.e. the element of choice, domination on the other hand is where the person has little room to maneuver because the margin of their liberty is extremely limited. Thus, Foucault condemns domination but not power. This view leads Norton (2000) to her concept of identity as a “site of struggle” which implies that, whilst a person may be positioned in a particular way given a particular discourse, he or she may resist this position and set up a “counter discourse” that positions them as powerful rather than marginalized. Brown (2011) noted how this view of

power and identity as being open is crucial as it opens up opportunities or possibilities of intervention, which is an important aspect of critical research. She concludes that power is a relational activity with knowledge structuring our interaction with an object or subject and enabling our intervention. Although language does not contain power it expresses power relations. In this study agency will be used within the construct of power.

#### **3.2.1.4.1 Agency**

Fairclough (2003) noted that in CDA pronouns are worth attending to in text because they provide a pointer to the “us and them” and the choice of pronoun use is socially significant with respect to the representation of agency. “We” on the other hand is associated with the universal and an attempt to redefine and reassert a particular identity (Ndambuki and Janks in Brown, 2011). Investigations the use of pronouns provides more evidence about a person’s relation to society and also tied with relationships of solidarity and power (Brown, 2011). Gee (2005) terms “I Statements” which indicate a strong level of agency and what they can tell us about a person’s socially-situated identity. In unpacking I- Statements Gee (2005) describes five different types of statements in relation to teenagers’ identities:

- the cognitive statement - when a person talks about thinking and knowing
- the affective statement - when a person talks about their desires and likes
- the action statement - what they do
- the ability or constraint statement - when they talk about what they can or have to do
- the achievement statement – where they talk about anything in relation to accomplishments

The use of pronouns also provides some indication whether an individual feels included or excluded and if they feel included, provide evidence as to whether this inclusion is in terms of active or passive role (Brown, 2011).

### **3.3 Chapter summary**

This chapter looked at the Critical theory theoretical framework and at the analytical framework which is Critical Discourse Analysis. The chapter also elaborated on context, meaning, identity and power as key constructs in the study of the use of mobile phones by female students from disadvantaged backgrounds. The next chapter, Chapter 4, presents the research methodology and methods employed for the study

## **Chapter 4**

### **Research design**

#### **4.0 Introduction**

The aim of this research is to provide an in-depth analysis of the ways in which a sample of four UCT first year female science students are using their mobile phones for affective and informal learning to support their academic life. Data was collected through three sources: survey questionnaires, in-depth semi-structured interviews and online ethnography.

As espoused in Chapter 3 section 3.1, this study is grounded on critical theory, meaning that it takes the critical educational research paradigm. According to Cohen, Manion and Morrison (2000) critical epistemology is aimed at understanding the political, ideological factors, power and interest shaping behaviours' and as such the perspective is geared at understanding, interrogating, critiquing, transforming actions and interests that are often taken for granted. According to Rambe (2009), academic relations are essentially about relations of social and psychological power, authoritative control and domination of subservient groups in discourses, and social practices are often immanent in these relations. A critical epistemological stance is therefore useful not merely to understand situations but to change them; in particular, it seeks to emancipate the disempowered, to redress inequality and to promote individual freedoms within a democratic society (Cohen, Manion and Morrison 2007).

#### **4.1 Research approach**

The research adopts a case study approach, working with students in the Academic Development Programme (ADP) in the Centre for Higher Education Development (CHED) at UCT. The case study approach is appropriate for this study since it is mainly used in studies involving a program, an entity, a person, or a group of people, and each object is likely to be intricately connected to political, social, historical, and personal issues, providing wide ranging possibilities for questions and adding complexity to the case study (Soy, 1996). According to Cohen, Manion and Morrison, "the purpose of such observation is to probe deeply and to analyse intensively the multifarious phenomena that constitute the life cycle of the unit with a view to establishing generalisations about the wider population to which that unit belongs" (2007: 258).

Thus, the case study explores real people in real contexts, with an emphasis on understanding the context as a determinant of both cause and effect (Cohen, Manion and

Morrison, 2007). The authors further elaborate that, this allows for the exploration of “the complex dynamic and unfolding interactions of events, human relationships and other factors in a unique instance” (p.253). This particular study explored the experiences of first year science female students as they used their mobile phones to adjust and conform to a new institution in a demanding academic field.

The study provides description of stakeholders’ views and experiences in the use of mobile phones by first year science female students. The research design applied is therefore, qualitative, and since it explores the use of the mobile phone in affective and informal learning it is exploratory and descriptive in nature, in the manner in which case studies are classified by Yin (1984) and Merriam (1998) respectively.

#### **4.2 Site selection**

The Academic Development Programme (ADP) at the University of Cape Town was established in the early 1980s in an attempt to address some of the academic problems encountered by students from educationally disadvantaged backgrounds, in particular, African students from schools falling under Department of Education and Training (DET) during the apartheid era (NARSET Report, 1996). A core ADP function is to develop and run a range of programmes and courses designed to foster the access, retention and success of students from disadvantaged educational backgrounds. As the diversity of the students’ intake has increased the ADP has placed growing emphasis on working with departments and faculties to design curricula and approaches that enhance the effectiveness and quality of mainstream provision.<sup>5</sup>

The NARSET report (1996) elaborates that much of the ADP activity takes the form of faculty based programmes, for example, Commerce ADP, Arts and Social Sciences ADP, Engineering: Academic Support Programme for Engineering in Cape Town (ASPECT), Medical ADP and Sciences (Science Foundation Program) now called the General Entry Program in Sciences (GEPS). According to the report, the different models that are followed in each faculty are dependent on the nature of the disciplines as well as the average level of preparedness. The reports purports that the models followed in engineering and medicine are a reflection of the fact that ADP students who enter these faculties are much better prepared academically than those entering the faculty of science.

Students in GEPS, therefore, register for a year of intensive half-courses in Mathematics, and three from Chemistry, Computer Science, Life/Earth Sciences and Physics.

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<sup>5</sup> <http://www.ched.uct.ac.za/departments/adp/overview/>

Students then register for a major in their second year, thus, GEPS offers students from disadvantaged educational backgrounds the opportunity to establish a sound educational foundation before proceeding in their second year to their chosen major.<sup>6</sup>

### **4.3 Participants**

The participants in this research were selected using purposive sampling, and restricted to female ADP students in the GEPS program. In purposive sampling participants are selected because of particular characteristics, the method relies on the judgement of the researcher when it comes to the people to be studied, (Patton, 1990). In this study, the ADP program represented students from educationally disadvantaged backgrounds, and the GEPS program is a good representation of a HEI initiative to produce more science graduates as well as representing students in sciences who have to go an extra mile to get into the science field as a result of their background.

### **4.4 Research methods**

This study used three data collection methods, a survey questionnaire a series of semi structured interviews and Facebook postings. As noted by Davidson & Tolich (1999:34) in Kane, Sandretto & Heath, (2002), the heart of qualitative research's validity is the use of multiple data sources and research methods, which allow the researcher to view the focus of inquiry from several vantage points.

Data from the 17 questionnaires collected from the survey was used to show students' access to ICTs namely computers and cell phones, access to computers off campus and use of cell phone applications. Eight students were in the first interview as they indicated their willingness to participate in the study. However only four interview participants were involved in the second interview as they met the variables most significant in this study which are:

- Educationally disadvantaged background
- Very minimum or non-use of computers prior to university life
- Challenges integrating into computer based learning
- Extensive use of cell phone to support academic life

#### **4.4.1 The survey**

After identifying GEPS students in the ADP program, data was collected through a survey in order to get participants. Surveys gather data at a particular point in time with the intention of describing the nature of existing conditions or identifying standards against which existing

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<sup>6</sup> <http://www.science.uct.ac.za>

conditions can be compared, or determining the relationship that exist between specific events (Cohen and Manion, 1994). In this study, the survey was used to determine the use of mobile phones by first year female students and their access to other ICTs especially computers and the internet off campus. Cohen and Manion (1994) also noted how surveys vary in their levels of complexity, in this study a small-scale survey of only 40 female students in the GEPS program was carried out.

The survey was carried out with 40 female students in the GEPS programme during a laboratory session. A lecturer in the Chemistry department, with years of experience in the ADP program invited the researcher to a three hour Chemistry laboratory session. Students were in four different labs and the lecturer and the researcher moved from lab to lab, quietly talking to female students, explaining the purpose of the project, handing out information sheets (Appendix B) and asking the girls to fill in the survey instrument which was a questionnaire. The questionnaires aimed to determine the most used technological tool by science female student as well as to seek out participants for the study. 40 questionnaires were distributed to the students as well as information sheets, which detailed the nature of the study.

#### **4.4.1.2 The Survey Questionnaire**

As noted by Cohen, Manion and Morrison (2007) the questionnaire is a widely used and useful instrument for collecting survey information, providing structured data, easy to administer and comparatively straight forward to analyse. The open-ended questions on the survey questionnaire (Appendix C) used in the survey were meant to determine the access and use of computers and the internet by female students in relation to where they lived, as well as to determine their use of mobile phones and mobile phone applications. Students were also asked to write down their mobile phone numbers if they were interested in being participants in the study. In site- specific case studies qualitative, less structured, word based and open-ended questionnaires are more appropriate as they can capture the specificity of a particular situation (Cohen, Manion and Morrison, 2007). The open-ended survey questionnaire provided relevant information concerning students' access of computers off campus, type of mobile phone as well as applications used on the phone.

Although the one page survey questionnaire only required few minutes to complete, the intensive nature of the experiments that the students were carrying did not allow students to fill it on the spot. The lecturer asked them to fill in the questionnaires after the session, and drop the questionnaires in the Assignment box in the department. The lecturer then asked

the support staff to collect the questionnaires over the following week. Out of the 40 questionnaires given out, 17 questionnaires (43%) were collected from the Assignment box. Eight students out of the 17 who returned the survey questionnaires (47%) indicated their willingness to participate in the second phase of the study which involved face-to-face interviews by putting down their mobile phone numbers on the questionnaire.

#### **4.4.2 Semi structured interviews**

The first semi structured interview aimed to engage interviewees in their background of ICTs and their use of mobile phones and their applications. The interview guide consisted of open-ended semi-structured questions. According to Bogdan & Biklen, (1998) asking an open-ended question is crucial in qualitative interviewing since it allows respondents to respond in their own words. The interview schedule (Appendix D) was adapted from instruments used by of interviews of students' access and use of ICTs in South African universities Brown and Czerniewics (2006, 2008). The questions were used in order to elicit a clear and deeper understanding of students' experiences in their use of mobile phones and consequently interpretation of data obtained. Semi structured interviews also allowed for comparisons of data collected across interviewees (Cohen, Manion and Morrison 2007).

The interviews took place at the convenience of the interviewees in the researcher's office in the Centre for Educational Technology. The aim of the study was explained to interviewees in the first interview, they were asked to ask any questions pertaining to the study as well as to fill in the Consent Form (Appendix A). On average, each interview took about 30 minutes, which is a total of 240 minutes for the eight interviewees in the first interview. A digital audio-recorder was used in all face-to-face interviews. This ensured that all interviews responses were securely captured. As noted by Fraenkel & Wallen, (1990) recording the interviews provides the researcher with files which could be re-played over and over again for continued study and analysis, which also ensures accurate representation of students' views.

During the first interview however, the researcher at one point had to interview three girls at the same time because that was the time available to them. Because of the intensive nature of the GEPS program, students are usually busy and the interviews had to be conducted at the convenience of the participants. Though data was collected, the researcher noticed that more detailed answers were obtained from the most assertive girl in the small group whilst the other girls tended to just nod in agreement to what the other girl was saying or just repeating what she had said. Thus the researcher missed individual stories of the not-so-assertive girls. However, in the second interview the girls were interviewed individually

and the researcher ensured that each girl explicitly told her story in relation to ICTS and mobile phones, including the missing gaps from the first interview.

Eight students were involved in the first interview. However, four girls were selected for the second interview based on their accounts of a disadvantaged background with minimal or no access to computers and the internet prior to university as espoused in section 4.4. The researcher studied and mined data from the girls' Facebook pages for the months of April and August. The researcher transcribed all interviews and the data was analysed together with data collected from other instruments.

#### **4.4.3 Digital presence on Facebook**

In order to determine the use of social networks for affective and informal learning by first year science female students, the researcher maintained digital presence on participants' Facebook. In the first interview, the researcher asked to befriend interviewees on Facebook so that she could have access to their postings. Rambe (2009) used this methodology in his study on the impact of using social networking sites on academic relations and student learning in a university setting. He described the processes used to collect data on Facebook as online participant observation and data mining, describing data mining as a process which allows access to a repository of original artefacts/postings for analysis.

The researcher therefore followed the Facebook interactions of participants for the months of April and August. April was chosen because the researcher observed that by this month in the first semester, lectures would be in full swing and first year students would have comprehended university life to some extent. August in the second semester was chosen because the teaching and learning process would be in progress.

Among the various mobile applications that female students use, Facebook was chosen as a data collection tool because it provides the affordability to collect postings (data mining) and it is the tool that all the students in the study used uniformly and with which they interacted with both family and friends. Furthermore, as Rambe (2009) espoused, Facebook has the most profound impact among the youth worldwide in terms of youth presence, social artifacts sharing, and social interaction.

Table 2 shows data collection dates and related activities.

Activity	Date
Give out survey questionnaires	7 May 2012
Collect questionnaires from ADP Science Lecturer	15May 2012
First interview : Eight girls	24-31May
Second Interview: Four Girls	8-10 August
Data mining on Facebook	April and August

Table 2: Data collection dates

#### 4.5 Data Analysis

The data from the interviews of the four students and their Facebook postings are analysed using CDA in Chapter 5. The students will henceforth be reported as girls as they preferred to be referred as such when the researcher asked for their opinion. The girls also requested to choose their pseudonyms in the study and the researcher granted their wish. The names of the girls in the study will therefore be Precious, Bianca, Fudge and Faith.

To analyse data from the interviews four main themes of Context, Identity, Power and Meaning; suggested by Gee (2005) are used in order to fully unpack domination, emancipatory and power ideologies hidden in the statements given as answers in the interviews. In the analysis the source of the data will be indicated as *Int. 1* or *Int. 2* showing that the answer was given in either interview one or interview two. Data from Facebook is clearly indicated: Facebook postings.

#### 4.6 Validity

Steps have been taken to avoid validity threat of bias in this study. Bias refers to the ways in which data collection or analysis is distorted by the researcher's theory, values or misconceptions (Maxwell, 2008). Maxwell noted how it is clearly impossible to deal with these problems. However, the digital presence on Facebook and two spaced interviews in a year helped in ruling out spurious associations and premature theories in this study (Maxwell, 2008). Respondent validation which is a process of systematically soliciting feedback about one's data and conclusion from the people you are studying has also been used in the study (Maxwell, 2008). The interview transcripts were given back to participants to ensure clarity of the responses they gave in the interviews. Maxwell (2008) believes this is the most important way of ruling out the possibility of misinterpreting the meaning of what participants say and do and the perspective they have on what is going on, as well as being an

important way of identifying the researcher's biases and misunderstandings of what was observed.

#### **4.7 Ethics**

This study involves human subjects; students in the ADP program at UCT, accordingly the Humanities Ethics Guide and the UCT Code of Research Involving Human have been adhered to. The research proposal gained approval from the Research Ethics Committee.

The UCT Code of ethics demands:

- Scholarly integrity and excellence
- Social sensitivity and responsibility
- Respect for the dignity and self-esteem of the individual and basic human rights
- Reference to clearly specified standards of conduct and procedures ensuring proper accountability.<sup>7</sup>

In addition to signing a Consent form (Appendix A) which detailed how the data would be used participants in the study were assured of confidentiality. Interviewees had access to interview transcripts and were given the power to comment or clarify responses as necessary. Their identity has been protected since they have been assigned pseudonyms in the study. On Facebook participants were assured that only those postings which related to their academic life and not personal life will be used in the study. In addition, the screenshots from the social network does not include the names of participants nor do they show their pictures.

#### **4.8 Chapter summary**

This chapter detailed the research approach of the study which is the case study approach. The approach is appropriate for this study since it involves real people in real context who are intricately connected to political, social, historical and personal issues, necessitating the use of CDA to analyse the data in the study. The chapter also provided explanations of the site selection which is the ADP program at UCT which aims to support students from disadvantaged educational backgrounds which automatically made it the target group for the study. The research methods were also explained in this chapter leading to the validity of the research study and lastly issues pertaining to ethics of the study were highlighted. The next chapter, Chapter 5 will look at the findings and analysis of results.

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<sup>7</sup> <http://web.uct.ac.za/depts/educate>

## Chapter 5

### Findings and Analysis

#### 5.0 Introduction

This chapter presents the findings and analysis of the study. The first part shows data collected in the survey questionnaires which show access to ICTs in relation to the location of the matric schools of the girls who answered the questionnaire; this helped in the demography of GEPS students in relative to the socio-economic position of their schools. The survey data also showed the number of students with mobile phones and the most used mobile phone applications.

#### 5.1 Data from survey questionnaires

Figure 1 shows the 17 students who answered the survey questionnaire and their access to ICTs, specifically cell phones and computers off campus.

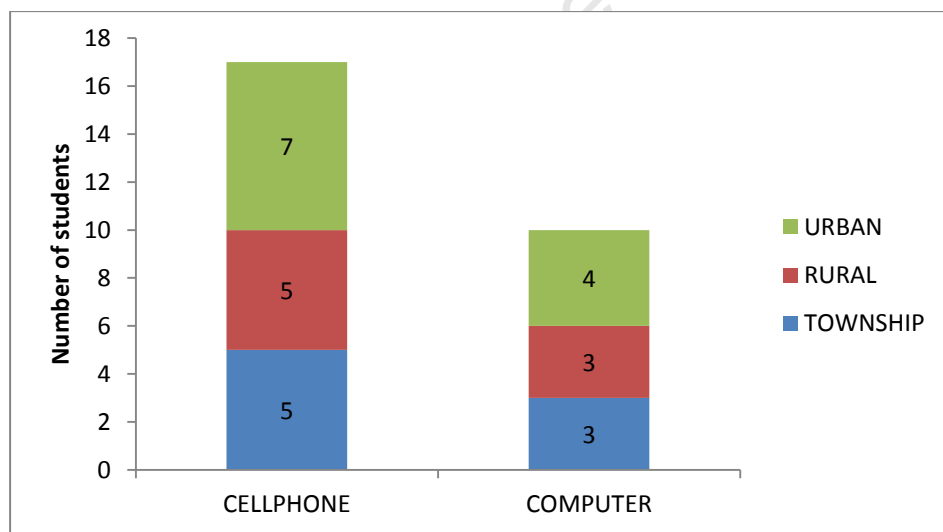


Figure 3: Distribution of access to ICTs off campus by students

In Figure 1, Urban represents students from former Model C or traditionally white school, Rural represent students from rural schools or former Department of Education and Training or traditionally black schools situated in rural areas, whilst Township represents both students from former black township schools or former Department of Education and Training, traditionally black schools and from former House of Representatives or traditionally coloured school.

The results show that all 17 students who answered the survey questionnaires have cell phones, regardless of where their schools were located. In terms of access to computers off campus four students from urban schools had access off campus, as well as three students

from rural area and three from township areas. Figure 4 shows a detailed profile of ownership and access to computers off campus by students.

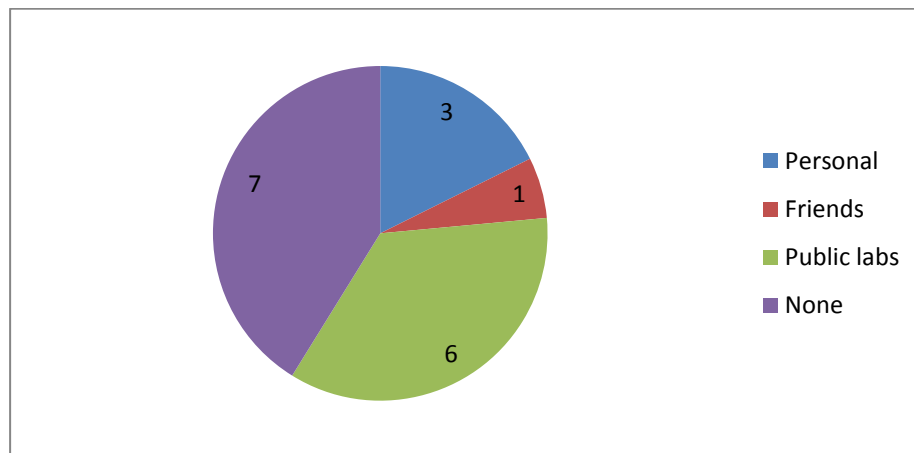


Figure 4: Access to computers off campus

Seven students do not have access to computers off campus, whilst six have access because they stay in UCT residents which offer computer laboratories facilities. One student accesses a computer through a friend whilst three students have personal computers or laptops.

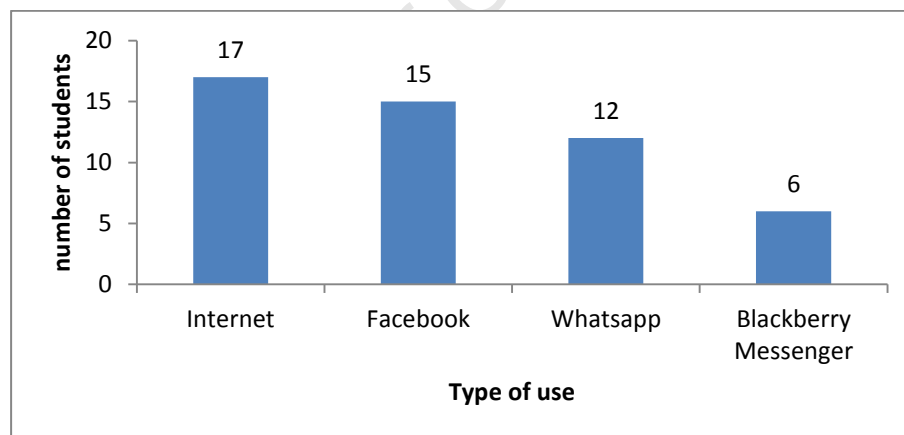


Figure 5: Cross-section of students' use of cell phones.

Figure 5 shows mobile phone applications that are mostly used by students. The fact that all 17 students can access internet shows that they all have smart phones which affords them connection to various internet enabled applications.

## 5.2 Data from interviews and Facebook

CDA is used to analyse the statements made by participants in the interviews under the key constructs of **context, power, identity, power and identity and meaning** in choosing science as a field of study choosing, rural or township background, choosing UCT as an institution of higher learning, the use of computers prior to university and at UCT as well as

using mobile phones in their academic life. To make the case studies more meaningful the data is presented as a combined narrative story for each girl indicating the source as either Int. 1 or Int. 2 in brackets showing that the data is either from interview 1 or interview 2 respectively. In the analysis the constructs are used as follows:

- ❖ **Identity-** to understand and unpack how science female students view themselves as science students, Gee's notion of big D Discourse is used. According to Gee (2005) this is useful as a way of explaining a social group's way of being in the world, their 'form of life' and their very identity.
- ❖ **Context-** in order to fully understand the **context** and background of the female students, the girls were asked whether they considered their **home areas rural or urban**, which **technology they had access to prior to university** between the computer and the cell phone and their **integration into a HWU**. This helped in understanding their socio-economic and cultural background. To understand how the first year female students from educationally disadvantaged backgrounds integrated and merged in to UCT, girls were asked why they chose UCT and their experiences at the university. In this analysis, UCT is viewed as a social good, and the respondents' answers are analysed to determine the perception on UCT as an academic institution.
- ❖ **Power-** To answer the question whether first year science female students' face **problems with computer based learning**, the girls were asked first, their experiences of using computers in a compulsory computer test at UCT and second, their experiences in computer based learning. The view of **power** in this part of analysis is where the subjugated are compliant in their powerlessness, and they fail to recognize that their interests are at risk or not making any attempts to defend these interests. Power is also used to understand how first year science female students had **progressed into computer based learning** toward the end of the year, students were asked how their computer skills had improved and if their mobile phones had helped them in the transition. The construct of **power** is also viewed as a capacity to act, where people use power with things ... and power is used as an instrument of domination (Gee, 2005)
- ❖ **Power and Identity-** to determine the **type of technology mostly used by students** from educationally disadvantaged backgrounds, the girls were asked about the most important technology in their lives. Here the two constructs of **power and identity**

are used. The view of **power** used in this analysis, is as a capacity to act, where people use power with things and power is used as an instrument of domination whilst **identity** is viewed as a way of thinking in a specific distinctive ways.

- ❖ **Situated Meaning**-to understand the **use of mobile phones at university** by first year science female students the analysis looks at the meaning of the mobile phone to the girls at UCT, where meaning takes a specific meaning in a context of use, which Gee (2005) termed **situated meaning**. Context is very important in discourse analysis as Gee (2005) is of the view that language and context in most contemporary discourse analyses are usually reflexive, which means that utterances (what we say/write) influences what we take to be the context and our context influences what we say.

Whilst data from interviews is used in this construct, Facebook postings also fall under situated meaning as they show the affective domain including the manner in which the girls deal with things emotionally such as feelings, values, appreciation, enthusiasm, motivations and attitudes (Krathwohl, Bloom and Masia (1973, Chapter 2, section 2.8) as they form socially-situated identities in their new academic context.

### 5.3 Precious's story

Precious is an 18 year old Xhosa girl in the GEPS programme at UCT studying Biochemistry. She is from Kimberly a town in the Northern Cape Province of South Africa. She lives with her grandparents and has a 21 year old brother. She matriculated in 2011 at Vuyoethu Secondary School which is situated in the former black township where she grew up. This is her story:

#### Identity

##### 5.3.1. Female science Students

IQ: Why the interest to study Sciences?

*Though my mark were good in sciences when I was in primary school, when I got to secondary they were still the same there was no change, my brother was so science based, and he would always mmm sciences there is so much money in the sciences and stuff like that (laughs) and then but I met this other teacher, he was so passionate about sciences and stuff like that and he really encouraged me, like to engage in sciences and to like take a science career and stuff like that, and Jaa I basically enjoy the sciences so that's why I am in the science faculty.(Int. 1)*

The girl's agency is the achievement statement, she emphasizes her good ability in sciences and her own personal preference for the subject as her Discourse, she also expresses affective statement agency since she enjoys the subject. In her discourse, she highlights the influence of her brother towards the Conversations around sciences, as well as the important input of an influential teacher as these relationships influenced her choice.

Do you feel boys perform better in Sciences than girls?

*For me it's not like that, for me everyone is the same, No boy is going to say haikho man, sister coz no-one is going to like undermine you coz, she might know something that I don't know so I just can't undermine like that . I have never seen anyone in the lab like whatever you are doing whatever like undermine my work like that, like we always work together and help another stuff like that Jaa. (Int. 1)*

The girl disputes the Conversations that boys are better than girls as she dispriviledges such sign systems in society. She emphasises gender equality; and draws on the Discourse of UCT as an equal opportunity institution by referring to her own experiences as a science female student.

## **Context**

### **5.2.2. Rural and former black township background**

*Jaa, it's a location, but it's not rough its very calm and quiet. (Int. 1)*

The student is quick to dispel the Conversations of violence associated with locations or former black townships in South Africa by emphasizing in her discourse that her home area in contrast to other locations/townships is calm and quiet.

### **5.2.3 Computers and cell phones in background**

Do you have a computer at home, family or personal?

*No we don't have, it's my brother who is at university who has a laptop. (Int. 1)*

The simple statement shows that the computer is not part of the home discourse but an esteemed luxury good in the family and is crucial for a special status associated with university Discourse.

Did you use computers in high school?

*Oh at my school we had like a subject that was more like into basics but I just didn't choose it, I just did geology over it (Int. 1)*

Whilst computers were within the school context they were regarded as a school subject and not as a tool to enhance learning, thus by choosing another subject the computer was no longer part of the girl's discourse.

When did you first own a cell phone?

*I was exposed to cell phone but I didn't get to use them I think grade 10 somewhere around there coz my grandma told me, you will never get a phone until grade 12 but I finally got it in grade 10. (Int. 1)*

The cell phone has always been part of the girl's home discourse as depicted by her exposure to the technology from an early age. Though she might have owned her own cell phone later on in her teenage years the technology has always been a big part of her Discourse.

#### **5.2.4 Integrating into UCT a cosmopolitan HWU institution**

To understand how first year female students from educationally disadvantaged backgrounds integrated and merged in to UCT a HWU; the girls were asked why they chose UCT and their experiences at the university.

*In Kimberly there is like Unisa, no the thing is I applied to UFS, but then the thing is I wanted to go away, not that I hated home, noo, but I always wanted to go away. You know Bloemfontein is the second version of Kimberly, you get to meet the same people, so I applied to UCT and then UCT accepted me and I was like I will choose UCT over UFS, UCT is the best University in the country (Shrugs her shoulders).(Int. 1)*

The student perceives the idea of moving away from her home and her province as an emancipatory and liberating move, this made her shun local universities in her province. Thus whilst UCT's Conversation of being the best university was important for her, freedom and liberty were also vital contributors to the student's choice of UCT.

Is UCT what you expected?

*I thought it was going to be all work and no much time for fun but (laughs) the environment is so nice. (Int. 1)*

Due to the Conversations of UCT as a high achievement institution, the girl did not imagine that she would have time to relax at UCT. She perceived hard work as the main Discourse of UCT but is pleasantly surprised by the cultural dynamics of the institution.

## Power

### 5.2.5 Problems in integrating into computer based learning

How was the Computer Literacy test at UCT?

*Joo, I think like some questions you know what they are asking but we just don't know, but you must remember that thing is supposed to be like that but you don't know how to go about stuff, and stuff like that, but it was fine (Int.1)*

The agency of the girl is a cognitive statement as she talks about thinking and knowing. Her discourse shows powerlessness at the subjection to tasks that are assumed easy in the computer literacy test. The girl uses 'we' to identify herself and other digital strangers who felt challenged and repressed by the test which is dominant Discourse of the institution, but she accepts it because computers are considered a prime Discourse of higher education.

What has been your experience in using ICTs for learning at UCT?

*(Laughs) At least no essays in sciences but in BEAs we even research and do databases. The thing is like when you go to Microsoft words it's easy but now it's excel. Its eeh... its struggling man (laughs). (Int. 1)*

The student's humour in this statement shows her compliance to the Discourse of HEI enforced use of computers, she portrays a dismissive discourse at the same time expressing her powerlessness in regards to the difficulties she faces in using computers to learn, she is disempowered when using Excel and agonizes at how she has to struggle with this computer application

## Power and Identity

### 5.2.6 Technology mostly used by female students

*Cell phone, yes it's portable. (Int. 1)*

Since the cell phone has been part of her discourse for a very long time the girl identifies the cell phone is the most important technology in her life.

The portability of the cell phone means it is an empowerment tool that the girl can use wherever and whenever she needs to. With the phone in her hand and the connections it affords the girl believes she has the world in her pockets.

## Situated meaning

### 5.2.7 Mobile phones for informal and affective learning

What do you mostly use your phone to do at UCT?

*I sms people like how should we do that or call someone how did you do that, ask questions stuff like that. Yes and you ask questions like how did you do that maths Jaa. (Int. 2)*

The mobile phone has a meaningful place in the academic context in which the girl finds herself as it helps her to accomplish academic goals. The mobile phone allows the girl to exercise informal learning. According to table 1 in Chapter 2, 2.7, the type of informal learning the girl achieves through her mobile phone is **deliberative learning in current episodes**, which involves asking questions, which the girl can do anytime, anywhere through texting her friends or calling them as she studies.

*I expressed myself a lot on Facebook during exams and Jaa everyone would responded even yesterday I posted something about the chemistry practical, and everyone was like Jaa, Jee you can say that again, even people who are far away.*

The mobile phone also provided new meaning to the girl as a platform for affective learning since she could easily express her feelings including academic challenges on her Facebook status and friends and family would provide her with the emotional support she needs, reassuring her that she is not alone despite physical distance.

Facebook posting: 1 August 2012



Fig 6: Precious's Facebook posting

After a tiring day in the laboratory, the girl expresses her feelings on her Facebook wall using her mobile phone. Her agency is an action statement as she uses the metaphor "I am dead" to express just how tired she is. Her friends on the social network quickly responded to her emotional turmoil with the first posting responding to her in an understanding and endearing way. The second friend was not that gentle, however, as he suggested that if it was that bad she would not have the strength to post on Facebook thus encouraging her to bear the learning process. Two postings were in agreement with the girl and seem to be her classmates as they identify with her feelings and express the unfairness of the learning situation. The Facebook has therefore empowered the girl to express herself in a free manner as she can mix languages use short words and express herself in a way she feels comfortable with. The platform does not restrict who responds to her as both friends in and out of her context can be of help. It also helps her identity as a science student as her classmate can identify with her attitude and feelings after a learning situation. Thus the mobile phone and particularly Facebook as an application have situated meaning in the university setting for the girl.

## Power

### 5.2.8 Transition into computer based learning.

How are your computer skills now having been exposed to the technology for almost a year?

*Yes much better, like at least practice makes perfect and like the more you use it the more you get used to it, Jaa (Int.2)*

The girl is confident of her computer skills as she reaches towards the end of her first year; she perceives that the continued and imposed use of the computers has given her power over the technological tool

*I am moving away from my phone, I really need to because, Jaa sometimes it's disturbing I don't have problems with it if it's for fun like listen to music on it Jaa. My computer skills have improved because I am more attached to my computer now, because I have detached myself from my phone, it has really helped my computer skills. (Int. 2)*

To gain power over the computer the girl had to detach herself from her mobile phone meaning she has to disengage herself from a technology she has used since childhood, because of the Discourse and university context she finds herself. She considers her phone as an obstacle to achieving computer skills which are the ones recognized and useful for academic achievement at university. She no longer identifies herself with her mobile phone but with the computer.

### **5.3 Fudge's story**

Fudge is an 18 year old Tswana girl in the GEPS program at UCT studying Geology. She is from Kimberly in the Northern Cape Province of South Africa. She is an only child who grew up in a maternal home with her mother and grandmother. She matriculated in 2011 at a school in the former black township she comes from.

#### **Identity**

##### **5.3.1 Female science student**

IQ: Why the interest to study Sciences?

*I just like sciences (laughs) making bombs no not for killing anyone, and I like chemicals and putting things together finding results. I just think science is nice, it's interesting, and since the way we are made, we are all science (Int.1)*

The girl's agency is the affective statement. She draws on her own passion to the science subject. Despite Conversations of gender, culture and sciences in her background and the influence of other people her discourse shows her own passion of the science field and how it relates to people.

IQ: Do you feel boys perform better in Sciences than girls?

*We are equal and at the same level, we just help each other. (Int.1)*

The girl nullifies the Conversations that men are better than females in sciences and that boys perform better in sciences at HEIs; in her Discourse she believes men and women are equal and dependent on each other.

## **Context**

### **5.3.2 Rural and former black township background**

*I grew up the woods, like in the woods, I don't know why I call it that but it's not really the woods. I live in a location, and my house is near a bottle store so it gets rough (Int. 1)*

The girl description of her home area as a “woods” although she does not understand why she calls it that might emanate from the Conversations around black townships as violent and unsafe places to live or to that fact that it is primitive and disadvantaged in terms of infrastructure. In addition, the fact that she describes the discourse of living very close to a bottle store and how rough it is shows the treacherous Discourse associated with low income suburbs in the South African context

### **5.3.3 Computers and cell phones in background**

Do you have a computer at home, family or personal?

*No we don't have (Int. 1)*

The computer is not part of the home discourse and this seems normal to the girl.

When did you first use a computer?

*I was never interested in technology but there were computers at my primary school and we were exposed to them and we used them but they were just not interesting to me in and, Jaa in secondary they were also there. (Int. 1)*

Computers were part of the girl's discourse in both primary and secondary schools. She attributes her lack of interest in the technology to the fact that computers were not interesting, this might be because of the way the computers were being used in the rural context of the school.

IQ: When did you have your first ever phone?

*Like in primary grade 6, like my nice phone. (Int. 1)*

The mobile phone has been part of the girl's discourse all her life. She mentions that she only had her nice phone in grade six meaning she had owned other phones prior to that which she

did not consider nice, thus the cell phone has been a product of participation in her discourse for a long time.

#### **5.3.4 Integrating into UCT a HWU institution**

IQ: Why did you choose to study at UCT?

*To be away from home and to experience a new environment and people and UCT is like the best university in the country. (Int. 1)*

The girl perceives the move to learn at UCT is emancipatory, she believes the Conversations around the university as the best academic institution in the country will help her to get rid of imposed constraints which are associated with her disadvantaged background.

Is UCT what you expected?

*It is a lot more, and the support, Jaa I really appreciate the support that I get especially from my lecturers it's really cool. (Int. 1)*

The girl has found emancipation and empowerment as portrayed in her affective statement agency as she expresses her appreciation of the academic support she receives at UCT as this empowers her to achieve her goals.

#### **Power**

#### **5.3.5 Problems in integrating into computer based learning**

How was the Computer Literacy test at UCT?

*Joo, it was really hard (laughs) but Jaa I am getting used to it and my mom just got me a laptop (Int. 1)*

The girl uses the word Joo, to express the degree of powerlessness she felt in the computer literacy test, she also laughs at herself showing that she is to blame and not the institution. Expressing her compliance to the dominant Discourse, her agency is ability or constraint statement, at the use of computers at the HEI, and the fact that her mother had to buy her a laptop shows that she is going out of her way to comply with an unfamiliar Discourse despite its repressive nature.

#### **Power and Identity**

#### **5.3.6 Technology mostly used by female students**

*My cell phone because it's portable. (Int. 1)*

The cell phone is viewed as the most important technology in the girl's life since it has been part of her discourse all her life. The portability of the cell phone means it is an empowerment tool that the girls can use wherever and whenever they need to. The mobile phone and the connections it afford allow the girls to have the world in their pockets.

## Situated meaning

### 5.3.7 Mobile phones for informal and affective learning

What do you mostly use your phone to do at UCT?

*I can go on Vula on my small phone though it's small, when I was studying for exams I took pictures of stuff and I recorded myself reading a text and then I would listen to myself on my phone with ear phones, Jaa I asked my friends questions on BBM, at one time I asked a friend a question on Facebook via messages but she took forever to reply (Int. 2)*

The mobile phone has found new meaning in the academic context of the girl. Informal learning is made possible due to the fact that the girl can access the Learning Management System of the institution on her phone. This gives her power and control over her learning content wherever she may be regardless of time and place necessitating:

- **Implicit informal learning of past episodes** as she links what was done in class and lectures with her studying
- **Deliberative informal learning of past episodes** which involves going back to discussion and review of past actions, communications, events, experiences that would be on the Learning Management System

The mobile phone also acts as a study aid where she can study academic related pictures and listen to her notes increasing engagement with her learning content which would eventually increase her chances of passing at the institution, the mobile phone therefore allows her to achieve:

- **Reactive informal learning in past episodes** as brief near-spontaneous reaction on past episodes, events, incidents, experiences which is necessitated by the taking of pictures and listening to her recorded notes on her mobile phone.

*Jaa I always write on my status like, maths is giving me stress and people respond to me and they say like , hang in there and some of them are like Jaa, maths, so yes I get a lot of support.(Int. 2)*

*I got support mainly from my aunt on BBM, so she would ask how you are doing and stuff jaa and my grandma has Whatsapp now (Int. 2)*

The mobile phone also provides the girl with a platform to express her academic challenges allowing her to get support from family and friends from all over the country and even beyond. The fact that close members of the family can easily give the girl the emotional

support she needs to carry on through mobile phone applications is an important aspect of her academic well-being.

Facebook posting: 3 August 2012



Fig 7: Fudge's Facebook posting

The girl uses her Facebook wall to express her attitude towards life which is important in the academic context she is currently part of. The platform empowers her to encourage herself whilst at the same time encouraging others who might be going through the same challenges. The agreements to her statements by her friends will strengthen her resolve and assure her that others identify with her situation as the application provides emotional meaning in her academic context.

## Power

### 5.3.8 Transition into computer based learning.

How are your computer skills now that you have been using the technology for almost a year?

*I don't know cos (because) there is like a lot I still don't know on my laptop, even If I upload a new programme I don't know how to because I don't know how to use it, cos I have windows 10 now which I got from my brother and I need help with it even the basic stuff. (Int. 2)*

The girl still expresses her powerlessness over the computer even though she has been exposed to it and has been expected to use it for three quarters of the year. She is aware of her

shortcomings when it comes to computer use and how it remains a challenge affecting her use of the technological tool for learning.

Has your mobile phone helped you in terms of transition into computer based learning?

*Since my blackberry keyboard is the same as computer keyboards I know where the letters are and so I can type faster now Jaa. I use my laptop more now, so cos I am now in residence so it's easy to connect to internet and stuff. Like this Khan academy I can go on internet and get stuff. But my cell phone I can't live without my phone. It will always be my phone.*

The girl perceives that her mobile phone assisted her to move into computer typing, thus the mobile phone has been an empowering tool enabling her to move into an unfamiliar territory. She can now access more academic materials using her laptop, showing a good level of transition though she still easily identifies herself more with her mobile phone.

#### **5.4 Bianca's story**

Bianca is a 17 year old Zulu girl in the GEPS programme at UCT studying for a Bachelor of Science degree in Chemistry. She is the eldest child in a family of 5 children and comes from Isibingo a rural village in the province of Kwa-Zulu Natal, South Africa. She matriculated in 2011 at Clairwood Secondary school, which is situated close to her home. This is her story:

##### **Identity**

###### **5.4.1 Female science student**

Why the interest to study Sciences?

*Basically like anything you are doing, the teachers they are like motivating you and also like the fact that, you are always noticing male teachers teaching science subjects and everything, and it means you are thinking liker, why not have a woman teach sciences, like in textbooks you always see like scientist like Einstein, whatever, it is always like white man (laughs) and I was like why not female scientist, why not be the first girl, the first black girl in a physics textbook rather than a magazine. (Int. 1)*

The girl's agency is the ability or constraint statement. She emphasizes the influence of teachers in her choice of science subjects, but also challenges the Conversation of sciences being a male dominated field thus she challenges the status-quo. By raising the issue of

gender and race, she challenges the powers defining who she is, thereby seeking emancipation and empowerment through breaking of barriers.

IQ: Do you feel boys perform better in Sciences than girls?

*(Shakes her head) For me it's like the same. (Int. 1)*

Contrary to gender Conversations to the girl the issue of gender difference in sciences is not significant at all, the shaking of her head and simple straight answer to the question shows her Discourse and self-determined stance on the subject.

### **Context**

#### **5.4.2 Rural and former black township background**

*I live in like a semi-rural area like a semi -location called Isibingo; So aah what else? Here I am in res (university residence). (Int. 1)*

The girl emphasizes that her home is semi-rural and semi-location, pertaining to the Conversations of both former black townships and rural area, thus in her discourse her home is not as backward and not as elite in terms of class and economic development. She accentuates the discourse that she has moved up the status and class ladder as she is now in residence at the most affluent university in the country.

#### **5.4.3 Computers and Cell phones in background**

Do you have a computer at home, family or personal?

*No, not at home I have a laptop here at res (Int. 1)*

The computer is not considered as part of the home discourse but since one was made available for her as she embarks on her university life, the computer is regarded as part of the university discourse.

When were you first exposed to computers?

*In primary it's just that I never had interest in technology, it's just that I was not that good in computers but there were computers (Int. 1)*

Computers were part of the girl's school discourse; she blames her lack of interest in technology as the reason why she is not good with the technology yet her lack of interest might be attributed to the discourse of the school as an institution, which might not have prioritized the computer as a learning tool.

When did you have your first ever phone?

*Waal, when I was in grade 7, I used to call Mom (Int. 1)*

The mobile phone has been part of the girl's discourse since primary school and a connecting tool with her mother for a long time.

#### **5.4.4 Integrating into UCT a cosmopolitan HWU institution**

Why did you choose to study at UCT?

*Basically, it's like, I like meeting new people, new friends and having new experiences. I like UCT it's so nice (Int. 1)*

To the girl UCT represents a new experience, something different from what she is used to which represents a liberating and emancipatory experience. These aspects appeal to the girl.

Does UCT meet your expectations?

*Yoo I had high expectations for UCT, I thought I gonna (am going to) work all the time, no sleeping, no time. When I came I knew I was going to be focused (laughs) I thought I was not gonna laugh at all, Ok maybe that's a little dramatic, but that's what I expected, But the environment is like wow, I like it. (Int. 1)*

The girl also associates UCT with that hardworking Discourse because of its high calibre students and Conversations in terms of high success rate and ranking in the country, she emphasized the discourse that she was always going to be immersed in her academic work, as she perceived it was what distinguished her as a gifted student. However, she is amazed by the cultural dynamic discourse of the institution.

#### **Power**

#### **5.4.5 Problems integrating into computer based learning**

How was the Computer Literacy test at UCT?

*Joo, tough, but fine (Int. 1)*

“Joo” is an expression used to show dismay and powerlessness, depicting the experience of the girl in the induction computer course. The girl admits that it was tough, but since it is the Discourse imposed by the institution she accepts it. According to her, computers are part of university Discourse and no matter how disempowered and dominated she feels she must conform to it.

On her experiences on computer based learning. She says:

*The good part is we do not write essays (laughs) but we have done two essays in BEAs which is like Geography with Biology. Ok, shoo but Excel is tough (Int. 1)*

The students still feel disempowered in the use of computers when it comes to learning, she expresses her relief that she is not in the faculty of Humanities where she would be expected to use computers more, however her discourse shows distress in the use of Excel in sciences which is a huge challenge to her.

### **Power and Identity**

#### **5.4.6 Technology mostly used by female students**

What is the most important technology in your life?

*Cell phone, Jaa, you can go on internet with your cell phone, go on TV, it's like everything in one. You can use your phone in place of a computer (Int. 1)*

By emphasizing the discourse that she can use her mobile phone in place of a computer, the girl recognises the emancipatory power of the mobile phone. She realises that one does not have to own a computer to be connected anymore as the mobile phone provides similar affordances thus the tool is a liberating tool to the Conversations associated with computers as it reduces the digital divide.

### **Situated meaning**

#### **5.4.7 Mobile phones for informal and affective learning**

What do you mostly use your phone to do at UCT?

*Yes like I always go to the internet when I am studying like umm.. during when I have a question sometimes I just can't get the message coming across from the passage or the book I am reading I will just google the stuff on my phone. I have friends in res so like I just call them Jaa like can we meet up. (Int. 1)*

The mobile phone provides situated meaning to the girl in the academic setting she finds herself. The phone enables informal learning for the girl mainly:

- **Reactive informal learning, in current episode** which involves noting facts, ideas, opinions, impressions; asking questions which occurs when she searches the net on a concept she is studying.
- **Deliberative informal learning, in future behaviour** which involves planning learning opportunities as she calls her friends for a meeting to study and learn together.

The girl also uses her mobile phone for affective learning to stay in contact with family and friends, as they provide her with the emotional support she requires:

*I always call home! (laughs) I use facebook more than Mixit, I only have like my cousins on my facebook. Like I wouldn't write on status but I wouldn't write private messages to individuals on facebook and Jaa, they would provide the emotional support that I need. The main support I got from my phone was emotional Jaa from my family and friends (Int. 2)*

The omnipresence nature of the phone provides meaning to the girl as she is always connected to home and family despite distance, the various application increases the number of people who can support her emotionally. Her joy shows this is very important to her, as she benefits from the support she receives from loved ones in her academic journey.

Facebook posting:



Fig 8: Bianca's Facebook posting

The girl expresses an observation on her wall as a result of a moment of reflection. Though it might have been a very deep observation, her friends managed to bring humour to the observation with various responses, which would lighten her mood or attitude allowing her to see the brighter side of life no matter how challenging things are for her. One of the friends on comment two however, agrees with her which is important for the girl as she is assured that someone identifies with her situation. The application therefore, allows the girl to express her observations thus Facebook is an emancipatory tool to air her inner thoughts. The fact that she can get responses from friends all over the country or world means the support is not restricted to context, while at the same time there is someone who will identify with what

she is feeling. The situated meaning of the mobile phone is therefore enhanced for someone who is thoughtful and reflective in a new academic context.

## **Power**

### **5.4.8 Transition into computer based learning.**

How are your computer skills now compared to your first few months at university?

*I have got the hang of it but like since I am like a bit ba-aad with technology I just use it when I need a break coz it's like when I need a break or when I need to find my way around or a lecture venue has changed what so I go on Vula check my emails and just read upon what's new or what's happening etc, and on my Facebook I just go online check what's going on in other peoples' lives, and what I am missing out Jaa (Int. 2)*

The girl perceives that her computer skills have improved a little but because of her bad experience with computers, she classifies herself as someone not good with all technology, showing how the dominating force of the technological tool has affected her self-esteem. She is three quarters into her first year, yet computers are not yet a priority in her learning as she only uses them to relax and for other minor things, otherwise they are still a dominating force in her academic career.

Has your mobile phone helped you transition into computer based learning?

*Not for me, coz like my phone model the keyboard are not the same as the computer, but the computer is not that bad anymore but I still need to know a lot of things.(Int. 2)*

The mobile phone has not helped the girl in mastering computer skills at all, she perceives this is due to the make of her mobile phone; she suggests to some improvement in her computer skills though she still feels its domineering power in her studies.

## **5.5 Faith's s story**

Faith is a 17 year old Sepedi girl in the GEPS programme at UCT studying Computer Science. She is the first born in a family of four kids. She comes from a rural area in the Limpopo province of South Africa. She matriculated in 2011 at Molautsi Secondary school, which is a rural school close to her home. This is her story:

## **Identity**

### **5.5.1 Female science student**

Why the interest to study Sciences?

*Joo (laughs) science is interesting, its more challenging, actually I love the challenging stuff, I love to be challenged, then if something is easy for me (shrugs her shoulders) Jaa my teachers encouraged me they just saw that I love sciences and I love Maths a lot , soo ..(Int. 1)*

The girl's discourse is that of self-determination and empowerment, she portrays affective statement agency in her passion for the science field as she talks about loving challenges and would feel despondent if not involved in something less challenging.

IQ: Do you feel boys perform better in Sciences than girls?

*Actually that's true, but at my side, like, I never let any guy bit me, I was always the best from grade 8 to grade 12, I made sure of that, and people are always like why are you in Sciences, Jaa but here it's not the same but in computer science you find that there were more boys than girls actually when we started, I think we were like 3 girls but then some came from the mainstream class. (Int. 1)*

The girl's agency is the ability and constraint statement as she expresses what she had to do in order to achieve best results in sciences. While the girl agrees with Conversations that men are better than females in sciences, she also dispriviledges such claims as she set to challenge the status quo by her self-determination to be better than all boys in her secondary education, even people around her question her Discourse as a science female student as it is a predominantly male subject even in class composition Discourse of UCT

## **Context**

### **5.5.2 Rural or former black township**

*I am from Limpopo I live, like it's a rural area obviously and I speak Sepedi, Jaa (Int. 1)*

The girl's perception is that since she is in the GEPS program which is primarily for educationally disadvantaged students, it is clear that she is from a rural area; she perceives that the researcher is aware of the discourse of UCT as an institution of elite students and she does not necessarily belong.

### **5.5.3 Computers and cell phones in background**

In order to understand the technology the girls' had access of computers prior to university, they were asked if they had computers at home and when they had their first cell phone

*No, no like the issue of computers is that I never had the chance to be with a computer before I came here and like Jaa, It was very challenging for me because, I actually chose computer sciences, and actually I didn't know what it was all about (laughs) but because I love challenges Jaa, I thought I will find out what it is all about and it turns out to be a lot more interesting and that's what I am going to major in next year.*(Int. 1)

Whilst the girl describes the non-computerized discourse of her background, her agency is a combination of cognitive, affective and ability and constraint statement as she is self-determined to take a career field in an area which is novel and challenging to her. She is determined to be emancipated from the imposed constraint of her background as she forces herself into the discourse of digital natives.

IQ: At what age did you own you on cell phone?  
*I think grade 8, I used it ... it was just ah, calls and sms.* (Int. 1)

The mobile phone has been a part of the girl's discourse for quite some-time however, though she is dismissive of its impact as she takes for granted the purpose of the mobile phone in her life.

#### **5.5.4 Integrating into UCT a cosmopolitan HWU institution**

Why did you choose to study at UCT?  
*Yoo (laughs) UCT is like the best, no like the thing is like I always want to come to UCT, and the most challenging part, ok, like the most amazing part is that I only applied to UCT and got accepted at UCT Yes (laughs)* (Int. 1)

The excitement of the girl and her self-determination to learn at UCT is obvious as she alludes to the Conversations of the institution being the best in the country. Despite her rural background the girl was determined to learn at the institution. Her agency is affective statement as she expresses how she likes the institution and desired to be part of it; by doing this she resisted the powers that defined her as a rural disadvantaged person as she sought emancipation regardless of her class and status in the country.

#### **Power**

##### **5.5.5 Problems in integrating into computer based learning**

What has been your experience in using ICTs for learning at UCT?  
*So like I went to a school that didn't have you know, that actually did not have much technology, you know technology is not that OK, you know, so it's like, when I look at my*

*school comparing to the situation which is at UCT it's not like Ok, it's so not OK, because I feel so low in terms of status and where I come from and Jaa, that's it (Int. 1)*

The girl's view of power is exclusion. To express the challenging discourse in which she finds herself in, she compares the different context and discourses associated with her rural background and UCT in terms of computer use. She implies the Conversations of digital divide, and expresses her powerlessness in relation to her new context, and challenges the political ideologies which perpetuate such disparities as she compares her low status and class to UCT in regards to the use of computers for learning.

**IQ** How was the Computer Literacy test at UCT?

*Joo, tough nee (Int. 1)*

The student expresses her powerlessness and dismay at the test but accepts it as part of the discourse of higher education.

*Ms Word is like Ok, but Excel (shakes her head) not easy (Int. 1)*

While the students view some part of using computers as not that bad she expresses the challenge she faces in Excel, shaking her head shows that she feels disempowered in the situation which she has to comply with as it is the discourse of higher education.

## **Power and Identity**

### **5.5.6 Technology mostly used by female students**

What is the most important technology in your life?

*My cell phone, yes, I own blackberry, blackberry is nice. (Int. 1)*

The girl does not only believe that her phone is the most important technology in her life, the emphasis on the brand of the phone shows that to her it is also a status symbol, thus representing power and identity to her. With that phone in her hand, no-one really cares that she is from a rural background as the Blackberry phone empowers her in any discourse setting.

*Jaa , my cell phone is more important , Jaa, it suits more, like it's easy to carry, Jaa like If I wanna call somebody, I just like do the thing, straight forward (Int. 1)*

Because the cell phone has been part of her discourse for a long time and is part of who she is, it is the most important technology in her life. The girl views her phone as an

empowerment tool, presenting it as a suitable and portable tool ready for use whenever she needs to and unlike her experience with computers it is not complicated to operate.

### **Situated meaning**

#### **5.5.7 Mobile phones for informal and affective learning**

What do you mostly use your phone to do at UCT?

*Waal actually I just use it for whatapping, facebook and all these things Jaa. Jaa like you know, when we discuss something on whatsapp when I am studying I can even go back to that message and check for it, jaa and yes, I google stuff and I whatsapp to ask schoolwork questions to friends, classmates (Int. 1)*

*Ok, you find like umm when I was preparing for exams umm, most of the times if I had a question I would use Whatsapp obviously coz it is was just there and I would use Whatsapp to communicate with my friends and with my classmates obviously jaa, so if I forget something I just ask. I also use Google mostly on my phone especially in chemistry (Int. 2)*

The mobile phone applications has new meaning at UCT for the girl as she uses it for informal learning through searching the net and asking academic related questions to friends and classmates aiding her in understanding concepts. As elaborated in Chapter 2, 2.7 the mobile phone enables the girl to achieve the two types of informal learning which are:

- **Implicit informal learning with past episodes** which involves implicit linkage of past memories with current experience as she goes back to academic related Whatsapp messages sent previously when she is studying
- **Reactive informal learning, in current episodes** which involves noting facts, ideas, opinions, impressions; asking questions which occurs when she searches the net or ask a friend a question as she studies

The girl also uses her mobile phone for affective learning as she gets the emotional support she needs from people who care for her despite distance:

*Whatsapp, I use it to chat with friends back home and my former educators, they support me and they always ask about UCT. (Int. 1)*

.... even if I don't have anything on my wall I would still inbox people for academic or emotional support, I always inbox my aunt on Facebook and she helps me when I am low (Int. 2)

The mobile phone helps the girl to keep in touch with friends and former educators who act as mentors urging her to work hard and keep spurring on which is important for her academic success. The Facebook inbox provides her with the privacy she needs to get personal emotional support from a close relative when she is overwhelmed with university life.

Facebook posting: 2 August 2012



Fig 9: Faith's Facebook postings

The girl expresses her enthusiasm at her new area of study her agency is affective statement as she expresses her love for computer sciences. The Facebook empowers her to express herself and to receive encouragement from friends. Whilst one friend takes a lighter side to her statement (comment 1 and 2) the other friend prompt her to justify what that means for the girl in her future studies as he also identifies with her passion (comment 3 and 5). Thus, the platform empowered the girl to reinforce her passion and decision, giving the mobile phone a situated meaning in the academic context which might have been possible without the tool.

## Power

### **5.5.8 Transition into computer based learning.**

Has your computer skills improved now that you have been exposed to the technology for almost a year?

*Yes, but if I had used computers since primary Joo it would be such a difference! (Int. 1)*

In the first interview towards the end of first semester, the girl observes some improvement in her computer skills but still feels her repressive background in terms of technology still hinders her full manipulation of the computer as a learning tool.

*It's very good and improving, very good. I can use my laptop now actually I just love Comp Scie, I like it. I think I find it more interesting and Yes, I spend most of my time doing it. I dedicate most of my time to Comp Scie! (Int. 2)*

By mid second semester the girl was confident and satisfied of her computer skills her agency is affective as she expresses her love of her chosen field of study, Computer sciences. To master the computer as a tool and field of study the girl has devoted more time to it than is normal:

*It's actually good, you find that I spend most of my time on my laptop, it's either I am in front of a computer or my laptop, that's what I do. You find that with everything I need a website to search for something and also for computing, I need my laptop (Int. 2)*

The girl reveals her dependency on a tool that did not exist in her life prior to university. The discourse of the university setting has dominated her and she gives up any leisure time to master the tool. Her agency is of ability or constraint statement- when she expresses what she needs to do on the computer or her laptop.

Has your phone helped your transition to computer use in anyway?

*My phone has helped me because you know like the keyboard my phone is more like the computer, so like I started with it, they are more like similar so my speed in typing has improved (Int. 2)*

The girl has found some transferable skills from her phone to the computer and a good knowledge of her mobile phone keyboard has empowered her to master the same aspect on the computer.

## **5.6 Summary of Analysis**

### **5.6.1 Context**

The girls describe their home context as location, semi-rural, woods and rural as they make reference to the discourse of their homes in terms of violence and poor economic development. Computers are not part of the home discourse at all; however, two girls infer

that they are part of the university discourse. Whilst three of the girls had computers in their schools they blame their lack of interest in the technology for the reason why they did not acquire necessary computer skills in their background. Cell phones however have been in the girls' context and part of their discourse for a long time that they tended to take the technology for granted.

On integrating into a HWU the girls infer to the Conversation of UCT as the best university in the country. They also allude to the Discourse of hard work and achievement associated with the institution. The university therefore provides emancipation for the girls from the imposed constraints of their backgrounds. Thus attending UCT is liberating and empowering as they have managed to remove obstacles in their background to achieve the freedom to learn at an institution that will allow them to accomplish their goals.

### **5.6.2 Power**

The use of computers at UCT however is a domineering repressive force for the girls. They express dismay, failure and powerlessness at the imposed use of computers for learning. They are aware that they are only a few who face such challenges at an elite university such as UCT and so they feel they have to comply with the Discourse of the institution.

Nevertheless, cell phones are empowering tools as they have mastered the tool and can manipulate it to suit their purposes within the academic context. The girls regard the tool as the most important technology in their lives especially because of its ubiquitous nature and the fact that they can use it on demand.

The study shows that the mobile phone has played an important empowering role for two of the girls, Fudge and Faith to move into computerised learning since components of the cell phone which are similar to the computer have enabled them to master some computer skills. Although Faith still feels cheated because she was not exposed to computers at an earlier stage like other students, as she perceives this would have made a great difference in her life. Bianca still feels disempowered when using computers and she perceives it is because she is not good with all technology. On the other hand, Precious has completely detached herself from the phone despite the way it has helped her at university. She perceives that the only way she can master the computer is to disconnect herself from the only technology she has ever used. In her opinion over dependence on the mobile phone is distracting and will mean she will always be powerless when it comes to the computer.

### **5.6.3 Identity**

The girls identify themselves as female students in the science field despite Conversations of gender in the field. Their agency includes achievement, affective, ability or constraint statements as they view themselves as science students. Their Discourse is of emancipation from repressive constraints in their background as they aim to achieve in the male dominated field regardless of gender or race.

The girls also identify themselves with their cell phones. They recognise the mobile phone as the most important technology in their lives mainly because it has been part of their Discourse for a greater part of their lives and because it is the one tool, which enables them to fit in to the Discourse of UCT. The ubiquitous nature of the tool and the way it can be transferable in use provides meaning for the girls making it easy for them to identify themselves with the technology.

### **5.6.4 Situated meaning**

At UCT, the cell phone has found new meaning for the girls in the academic context. Whilst computers have been a repressive dominating force, cell phones have been emancipatory and empowerment tools as they enable them to achieve their academic goals. The tool has provided much needed informal learning in the girls' new academic journey. Through affective learning afforded by mobile phones, the tool has provided the girls with a platform to express themselves at the same time receiving much needed emotional support from family and friends despite distance.

### **5.7 Chapter Summary**

The Chapter presented data from the survey questionnaires. The data showed that all 17 students who answered the questionnaires had access to cell phones. Seven students did not have access to computers off campus, six students had access because they stayed in university residents and the remainder either used a friend's computer or had their own personal computers. Overall, the survey showed that students used their mobile phone applications extensively especially Web search, Facebook, Whatsapp and Blackberry Messenger respectively.

The Chapter then moved to the individual stories and analysis of the data from the four girls. It has shown the background context of the girls, the absence of computers in these backgrounds, the availability of mobile phones at an early stage of their lives. The Chapter has shown the determination of the girls to enter into a male dominated science field and the liberty of learning at HWU. It has also shown the girls powerlessness in the face of

computerised learning and the domination of the tool at the HEI. The Chapter has however, shown the ability of the girls to remove obstacles standing in the way of achieving freedom and reach their potential by using a familiar technological tool which fit both their primary and secondary discourses. Thus, the Chapter has shown the high level of empowerment provided by mobile phone applications for first year female science students.

The next chapter, Chapter 6, presents the discussion of the study in relation to the primary and secondary questions of the study.

University of Cape Town

## Chapter 6

### Discussion of Findings

#### 6.0 Introduction

This chapter discusses the findings of the study in relation to the research questions and literature review. The discussion seeks to highlight the challenges faced by first year female science students from disadvantaged backgrounds in integrating into computer based learning and how they use mobile phones to support their academic life through informal and affective learning.

#### 6.1 Summary of research questions.

The following discussion will highlight the key research findings according to the research questions:

##### **6.1.2 What problems do first year female science students from disadvantaged backgrounds face with regards to integrating into computer based learning?**

Faced with a stereotyped view of women and sciences, the first year female science students sought to dispel the Conversations of sciences as a male subject and against all odds succeeded in the field from their early education years as they had a passion for the subject. As noted by Oldham (2000) research has generally supported the conclusion that there are no biological, neurological, or genetic factors at work in the creation of scientific gender disparity, rather, a combination of elements including social stigma of the sciences as “masculine”. The disadvantaged background of the female students however, with regard to the schools they attended meant, they could not get the best foundation in terms of science. As purported by Jacobs, (2010) science studies require laboratories, expensive equipment and well qualified educators, technicians as well as continuous money as well as institutional resources which rural and township schools cannot afford. The government and HEIs realised the need to increase access to higher education in the fields of science, engineering and technology to students from disadvantaged educational backgrounds and to improve the retention rates of such students once they have gained access to higher education (Kotecha, 1996). Thus, the GEPS programme at UCT empowered the female science students to excel in their field of choice.

To fulfil their dreams of being the best scientist in their respective fields the female students chose to study at one of the best institutions in the country despite it being a HWU with regard to the historical implications of apartheid in the South African context. Chaney, Muraskin, Cahalan, and Goodwin’s (1998) argued that disadvantaged students might notice differences from the general student population in such areas as race/ethnicity, academic

preparation, income, and culture, so they feel that they do not fit in. This study has shown that female students felt comfortable and at home at a cosmopolitan university, University of Cape Town, despite coming from totally different background and environment and they are satisfied with the support they get in the GEPS bridging programme.

UCT has fulfilled the girls' dreams in providing them with a chance to reach their potential in sciences whilst being exposed to the best educators and scientific facilities in the country, however, their biggest challenge at the institution was computer based learning. According to Ayo (2009), Africa's higher education system is probably the most internationalised in the world – not by participation, but by omission, as the weakest global higher education system as it relies heavily on the discourse paradigms set by others. Whilst the idea of all millennial students being digital natives (Prensky, 2001) might be true in other context it is not so true in the African context.

The study showed that the female science students from disadvantaged backgrounds are digital strangers (Czerniewicz and Brown, 2008). Their background had minimal use of computers, which was not in their homes but at some schools or they had no access at all of the technology prior to university. The computer literacy test which is compulsory at the beginning of the year alienated them from the rest of the first year students' body. At an institution where class is usually irrelevant the students felt discriminated against and questioned why resources were so unequal in the country. The computer lessons provided for them did not provide them with the necessary skills and confidence needed to survive in computer based learning, mainly because they already felt estranged from the university Discourse. The students expressed relief that they were not in the faculty of Humanities which they believe has more intense computer based learning, but nonetheless complicated computer applications like Excel in their own field left them powerless and vulnerable. Educators give out computer based tasks without considering the different technological background of the student body; in addition announcements and resources are given on the Learning Management System under the assumption that everyone is comfortable with computers. This compulsory use of computers might be considered to be intimidating for disadvantaged students as some end up concluding that technology is not for them. Imposed computer based learning left the girls in this study powerless and dominated. Brown and Czerniewicz (2006) study of ICTs access and use at HEIs showed that students from disadvantaged backgrounds were fearful of computers and less positive about their use as a beneficial tool.

### **6.1.3 What technologies do first year female science students from disadvantaged backgrounds mainly use at university?**

Whilst female science students face problems in using computer related applications the study shows that the students regard their mobile phones as the most important technology in their lives. The technology had been part of their Discourse most of their lives and they feel comfortable using it at UCT. This corresponds with the observation by Czerniewicz, Williams and Brown (2009) that in contrast to computer access, cell phone ownership at HEIs is pervasive and ownership is not socially differentiated. The students therefore identify themselves with their mobile phone as it is part of who they are. Of note is how the two constructs of power and identity merge as the girls express the importance of mobile phones in their life. This indicates that the technology is not only part of the girls Discourse but also an important empowerment tool at university. The students appreciate its ubiquitous nature and the fact that it is portable and can be used in place of computer for some purposes. The study showed that all the science female students had smart phones ranging from simple to complex so they could all access the internet and various computer applications but of note are the Facebook, Whatsapp, Blackberry Messenger and Web search which they used for informal and affective learning. This corresponds with Howard's (2012), observation that for students in South Africa mobile phones are not just for texting, they are often the only route to the Internet, especially for the many who have little or no reliable computer access off campus.

### **6.1.4 In which ways can the use of mobile phones liberate and support students' academic life?**

The study showed that female science students feel emancipated and empowered by the mobile phone as they use it to support their academic life through affective and informal learning.

#### **6.1.4.1 Support through affective learning**

The female students in the study are teenagers below the age of 20 years and they are all from provinces far from UCT. In addition it is their first time away from home thus they need emotional support from family and friends. The study showed that whilst students used their mobile phones to call home or send text messages to their parents or guardians, internet enabled applications on their mobile phones such as Facebook, Blackberry Messenger, Whatsapp and Mixit also enabled them to get the emotional support essential for their intellectual well-being in a challenging academic field. Facebook is especially important for the science female students as the objectives of affective learning are typically oriented

towards participants' feelings and they are often difficult to measure in quantifiable terms, however it is important that students appreciate what they are learning or 'feel good' about themselves whilst in a learning context (Tooman, n.d.). Facebook allowed the science female students to air their feelings, values, appreciation, enthusiasm, motivations and attitudes on a democratic platform whilst at UCT. The postings show emotions influenced by the learners' mood and also reactions influenced by the learning process as elaborated by Wlodowski (1985). The social networking site therefore provides these conditions, which according to Mezirow (1990) are the ideal learning conditions for affective dimension to be successful:

- an environment which promotes a sense of safety, openness and trust.
- activities that encourage the exploration of alternative personal perspective problem posing and critical reflection.

#### **6.1.4.2 Support through informal learning**

Whilst mobile phones are a familiar technology for the female science students from disadvantaged backgrounds the tool found new meaning for the students as it gave them the freedom to use it for the things they were supposed to do on the computer but they were not yet able or comfortable to do. Of note is informal learning, as espoused by Eraut, (2004) informal learning provides a simple contrast to formal learning or training that suggests greater freedom for learners as it recognizes the social significance of learning from other people, but implies greater scope for individual agency than socialization. The mobile phone enabled the science female students to initiate learning outside school hours with a familiar tool using languages and phrases that they are comfortable with thus giving clarity to concepts that would have been missed or misunderstood in formal learning context.

Whilst in the study the mobile phone was used for individual learning processes such as internet search, accessing the UCT Learning Management System, Vula, studying aid through recording of own notes and listening to one self, the mobile technology mainly supported learning from others through its various applications. The study showed that the science female students would ask course related questions to classmates using Whatsapp and receive feedback which is not only useful just then, but even later as the students can go back to the postings to get clarity. Facebook was also instrumental for informal learning as the students would inbox each other with questions and answers and the tool also affords the storage of such information for later use. The mobility and ubiquitous nature of the mobile phone necessitates informal learning, as it can be used at any time and in any place thus the following characteristics of informal learning as espoused by Marsick and Volpe and Watkins

(1999) become highly possible because of the ubiquitous nature of mobile phone since informal learning is:

- integrated with daily routines.
- triggered by an internal or external jolt.
- not highly conscious.
- haphazard and influenced by chance.
- an inductive process of reflection and action.
- linked to learning of others [p. 5].

The study shows that the mobile phone is an important aspect of the students' Discourse and it empowers them to venture with confidence into a challenging academic field.

### **6.1.5 How can the use of mobile phones assist students' transition into computer based learning?**

The study shows that by second semester science female students had attained some degree of autonomy with the use of computers ranging from very small to relatively large extent. The students who were still struggling with the computer seemed to have developed a negative attitude towards the technology because they felt that no matter how much they tried, they always faced a hindrance in the use of the computer such as something new that they need to learn. A student reiterated that she is not just good with technology and just uses the computer because she has to or when she has nothing better to do. Brown (2012) describes such students as 'aliens' as they hover on the outskirts feeling excluded, crossing over for short period of time and then heading back home to the familiar, in this study it is the mobile phone.

Of note in this study is how two girls found some transferable skills from the mobile phone to the computer especially the keyboards; they noted that since the computer and their mobile phone keyboards are structured the same, (QWERTY keyboards) their typing skills on the computer have greatly improved as they can go to the letters without thinking.

This study has therefore shown how the use of the mobile phone has helped students who had problems using computers to transfer the skills attained on the tool to the computer. Students ascertain to the fact that the mobile phone has allowed them to master the computer to a certain extent. Thus an object/tool from the primary discourse of the girls has helped them to master a tool in their secondary discourse.

A student who intends to major in Computer Sciences has gone a step further in her quest to grasp the use of computers by dedicating most her time to the technology. Most of

her time is spent on a computer to the extent that on vacation she was teaching her father how to use the tool through her newly acquired laptop. Brown (2012) described such students as 'escapee' students who are desperate to get away from the confinements of where they have been and seeking better opportunities. She describes 'escapees' as outsiders who are keen to make the most of opportunities, by making a conscious decision to leave the old behind and to be proactive in acquiring the new, such students are eager to learn but aware of their limitations.

Another student is proud of her success in the use of computers in the second semester. She attributes her success to her constant practice and her detachment from her mobile phone. She perceives that her mobile phone is a distraction and a hindrance to the acquiring of important computer skills, which are an important part of university life. The student believes her mobile phone cannot help her in any way to use the computer. There is a contradiction between her primary discourse and secondary discourse, and shunning her mobile phone altogether displays that she is trying to fit in to the Discourse of higher education at the cost of her identity. Brown (2012) described such students as 'the converted' as she noted that for such students', migration into computer based learning is like a religious conversion where they leave the old behind and accept the new in the hope of belonging. She perceives that such students don the new cloak of technology and hope everyone sees them as indigenous people in the use of computers whilst they are figuring it out as they go along.

## **6.2 Overall summary**

The main question this study aimed to answer was:

### **How do first year female science students from disadvantaged backgrounds use their mobile phones to support their academic life at a Higher Education Institution?**

Using critical theory and CDA the study explored the experiences of first year female science students as they are exposed to compulsory use of computers at a HEI and how they used their mobile phones, which unlike computers have been part of their discourse for a long time to support their academic life. The study has shown that despite being disempowered as girls in their culture and social backgrounds they have risen above gender Discourses and succeeded to venture into a historically male dominated science field. Despite their class in society in terms of material possessions, in this case technologies such as computers the girls sought emancipation through the use of a familiar technological tool to support themselves in a challenging academic environment.

Whilst imposed computer based learning is more beneficiary to middle class and elite students during the first year of university it is the disadvantaged students who have had little

use or never used computers prior to university who are at the losing end. However, since emancipation is the process through which humans individually or collectively remove obstacles standing in the way of achieving freedom to a greater or lesser degree meaning more people can achieve their potential (Mingers and Willcocks, 2004). The mobile phone therefore, became the emancipatory tool for disadvantaged students to achieve freedom and reach their potential in a rather imposing and domineering environment. CDA was useful in fully unpacking the ideology, domination, power, emancipation and identity concepts in this research. Thus, much as the computer was a governing technology at university which left the female science students from disadvantaged backgrounds powerless and dominated, as it was not part of their Discourse, they rose above the repressive powers of using an unfamiliar technological tool by seeking emancipation through a familiar tool which is a mobile phone to achieve freedom and reach their potential in a challenging academic context. As noted by Rapetti, Picco and Vannini (2011) mobile devices are pivotal in students' everyday life and mobile technologies are expected to play a bridging role between informal and formal practices of learning.

### **6.3 Chapter Summary**

The chapter has presented the main research questions and how it is answered by the findings of the study: the study has shown that first year science female students use their mobile phones extensively to support their academic life through informal and affective learning. The four secondary questions were presented and answered in detail with relevant supporting or opposing literature. The last chapter, Chapter 7 presents the conclusion of the study.

## **Chapter 7**

### **Conclusion**

#### **7.1 Final Comments**

The unequal terrain in the education system as a result of the apartheid era is a born to contend with in HEIs. Universities have however, sought redress through the provision of extended learning programs such as the Academic Development Program at UCT which provide the necessary support to students from disadvantaged backgrounds. Such programme especially the GEPS programme have gone a long way in giving female students from underprivileged backgrounds an opportunity to fulfil their dreams in the science field despite gender and cultural bias in most African cultures. This study has shown that this is not the only area where HEIs have to go an extra mile in accommodating students from disadvantaged backgrounds. Whilst ICTs such as computers are an essential part of higher education as HEIs aim to produce information society ready graduates, students who have had little access or no access at all to the technology prior to university face the dilemma of being further marginalised (Broekman, Enslin and Pendlebury, 2002).

For the students in this study being female science students is a sign of power and emancipation, and they fully embrace the fact that they are GEPS students who have the opportunity to accomplish their goals. Their challenge however, comes with the use of computers at university. The use of the technology in their first year of higher learning left them in despair and rendered them powerless. The technology had never been part of their discourse, and in an institution that had shown no partiality or segregation, the students felt different from the rest of the student population, in a sense they were discriminated against.

The mobile phone on the other hand is pervasive and has transcended all boundaries regardless of socio economic status reaching even the most remote village in South Africa (Czerniewicz, Williams and Brown, 2008). Whereas the female science students are digital strangers in relation to the computer, the mobile phone forms part of who they are: it is the technology that has been in their Discourse all their life and forms part of their identity. The technology is an empowerment tool for them, Stald (2008) supports this notion as he noted that, mobile phones imply a view of first year female students as mobile, changing and developing from high school to higher education, as adolescence, they are very sensitive to changes in the relations between friends and families, and to the emotional and intellectual challenges experienced and mediated through the use of the mobile phone. Through their own initiatives, the students made meaningful use of the technology through affective and

informal learning. They harnessed the internet enabled applications on their mobile phones to advance their academic career and they could still find some transferable skills that could help their transition to computer based learning.

Since the mobile phone is part of the students' Discourse, they 'belong' even at a cosmopolitan university, as they can tap away on them with the same confidence and ease as the elite student sitting next to them in a lecture or bus. Mobile phones become crucial for informal learning, which requires learning with and of others in a particular context and drawing support from them. As noted by Pertierra (2005) unlike desktops and other immobile technologies, mobile phones closely resemble tools or prosthetic devices as extensions of the body, they become extensions of the hand allowing students to connect anytime, anywhere with anybody. The portability of the mobile phone makes it possible for first year female science students to access and exchange information independent of place, of physical location, while being on the move; the students are mobile and the device is mobile with them, above all support is mobile, meaning that it is available independent of time and space (Stald, 2008).

The pressure of computer skills for learning however, tend to put some students off technology all together and this would subsequently affect their throughput as the use of computers advances as the years progresses in a degree program. Exclusion of the mobile phone altogether in order to dedicate energy to acquire computer skills to fit into university discourse means over emphasis on the use of computers by the institution deprives some students of who they are as they lose part of their identity in order to fit into the secondary discourse of university life. On the other hand however, HEIs seem to face a unique opportunity to have an impact on learners in new and compelling ways since both in formal and informal learning environments learners can use mobile technologies to access additional and customized materials (Rapetti, Picco and Vannin, 2011)

## 7.2 Recommendations

- **HEIs** must be aware of the diversity of the student body and understand that first year students are comfortable with different types of technologies. In the South African context students from low socio economic backgrounds who make up a huge number of ADP students, know the internet through their mobile phone, thus to fully support them and integrate them into university academic life, policies must be put in place that value the mobile phone as an effective learning tool.
- **First year experience programs** should create Facebook groups where students can express themselves and get the support they need through mobile phone applications

as they settle into a new environment. As well as using email messages for announcements, applications such as Whatsapp, Blackberry Messenger and Mixit should be used when announcing events going on at the university as students from all socio economic backgrounds use these applications extensively.

- **Educators** should encourage the use of mobile phone application for collaborative and cooperative academic work, for example, Facebook groups and Whatsapp groups, where students can ask questions and get responses from classmates, tutors or lecturers. This would go a long way in accommodating students from disadvantaged backgrounds as it increases their engagement with learning content.

Educators should also be aware of the diversity of their students when giving computer based tasks in the early months of first year, especially in ADP. More computer support should be given throughout the year to the students so that they do not feel abandoned.

Whilst chatting on mobile phones might be a distraction in laboratory sessions, students should be allowed to take photographs of different stages of an experiment with their mobile phones as this helps them during quiet study time to recall and reflect.

- **Educational Technology departments** should initiate ways in which educators can use mobile phones to teach and learn and hold workshops to expose lecturers to the possibilities of mobile phones for learning.

Instead of treating the mobile phone separately from the computer Educational Technology departments should capitalise on the skills that students have acquired on the mobile phone and transfer them to computer training, for example typing and web searches. Students are most likely to embrace the computer if they can relate it to what they already know as the concept of learning from the known to the unknown is enhanced.

Computer skills lessons might be made available on mobile learning sites so that students from disadvantaged backgrounds can learn them at their own pace on a familiar technology.

Learning Management System should also be made available specifically for mobile phones.

### **7.3 Limitations of the Study**

- The participants might have been ashamed to divulge all information about their incompetencies in computers as computer skills is something that is taken for granted by other students in their age group especially at a cosmopolitan university.
- The researcher did not take actual screen shots of Whatsapp messages as the mobile phone is quite a personal device and this could have compromised the privacy of participants.
- Due to the small number of participants, the findings are not generalizable as a whole, though they provide a clear indication of how students from disadvantaged backgrounds use their initiatives to fit into a computer based learning environment.

### **7.4 Recommendations for further study**

As mobile applications are gaining popularity and internet connections on mobile phones are increasing possibilities for other more complicated applications it will be interesting to carry out studies on how harnessing the skills acquired through mobile phone and their applications and transferring them to computerised learning can enhance the throughput of first year students in the ADP program.

### **7.5 Overall summary of the study**

This study set out to examine how first year female science students from disadvantaged backgrounds in an ADP program used their mobile phones to support their academic life at University of Cape Town. A survey was carried out in a Science class laboratory session where questionnaires were handed out to 40 female students. 17 questionnaires were filled and eight students were interviewed to come up with a sample representative for the study. Four students were then involved in the study and semi-structured interviews and Facebook postings were used to collect data. The study used a case study approach with a critical perspective. The study was prompted by the researchers' involvement in the Access and Use of ICTs project in the Centre of Educational Technology at University of Cape Town, which has shown over a period of years that disparity exist among students' access and use of ICTs mainly because of differing socio-economic backgrounds. Thus, the study aimed to understand how disadvantaged female science students who face different cultural and gender marginalisation in society survive within an environment where they are digital strangers in relation to the computer. The study has established that; for the young science female students entering university, communication exchange with friends and family is important in a new institution as it provides the necessary emotional and intellectual supports. The mobile

phone is part of the students Discourse and because it is ubiquitous, it plays an important role for affective and informal learning while students are in the process of acquiring the much needed computer skills. The fact that students also find some transferable skills from the mobile phone to the computer means that these devices must not be viewed as separate devices but as complimentary tools. Besides the mobile phone being part of the students Discourse, Ng'ambi and Campbell (2011) noted that the main advantage of mobile phones is the 'always connectedness' they provide regardless of the changing contexts of users meaning; the convergence of time through space and the physical distance between the caller and 'callee' is theoretically immaterial. Hence the mobile phone is an empowerment tool for female science students in the Academic Development Program as it forms a huge part of their Discourse and gives them the freedom to stay connected to family and friends whilst using the same tool to enhance the foundation of their academic career in the field of sciences.

University of Cape Town

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## APPENDICES

### Appendix A: Consent Form for Research Participants

Research Study: The role of mobile phones in facilitating learning among first year female students at a Higher Education Institution.

Date:

Participant:

#### Are you happy to take part?

I would like to invite you take part in this research project. Before you decide, please read the information sheet provided.

Please Circle

I have read and understand the information sheet. YES NO

I understand that I can withdraw from this project at any time without giving any reason. YES NO

I am happy for the project researcher to look at my Facebook profile. YES NO

I am taking part in this project voluntarily YES NO

#### Can I use and screen shots from your social network pages?

##### Please read the following carefully:

I agree to my and screen shots from my profile and other mobile phone applications being used during the above research project. YES NO

I give permission for these images of me to be used in publications/presentations. YES NO

Your Name, Date, Signature

---

Researcher name, Date, Signature

---

## **Appendix B: Information sheet about the research project**

My name is Caroline Magunje. I am a Masters' student in The Centre for Education Technology. I am doing a study on the Access and Use of Information Communication Technologies, by first year female students at University of Cape Town.

### **What am I trying to do?**

The purpose of the project is to better understand how female students use technology in their first year of university

- How you use information and communication technologies (ICTs) like computers and your cell phone for learning at university
- What access to ICTs really involves for you
- How a cell phone is part of your everyday life
- How you use your cell phone applications for learning at university

### **What is the research for?**

The research is for a minor dissertation for a Masters' program in Education and Technology.

### **How will we use the research results?**

If there is a better understanding of what students are doing and how they use different ICTs especially cell phones it can help universities develop strategies for using cell phones as a learning/content delivery tool.

### **What do you need to do?**

My intention is to gain an understanding of how you use technology through talking to you, and observing and participating in your everyday ICT activities over the rest of the year. I will interview you at certain stages throughout the project, and ask if I may become your facebook friend and join other online networks you are involved in. Ask you to show us how you use your cell phone in your courses as well as get snapshots of your learning related cell phone communications.

### **Will my taking part in this project be kept confidential?**

All the information that I collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications.

### **Will I be recorded, and how will the recorded media be used?**

I will use screenshots from your online interactions and audio and/or video recordings from interviews only for analysis and for illustration in conference presentations with your permission. No other use will be made of them without your written permission, and except for me and my supervisor Dr Brown, no one outside the project will be allowed access to the original recordings. Original recordings will be stored on a hard drive only accessible to me and can be destroyed at any time at your request.

### **Can I withdraw from the research?**

If you are unhappy with any part of the research please let me know, you can withdraw at any time my mail is [caroline.magunje@uct.ac.za](mailto:caroline.magunje@uct.ac.za)

Should you feel your complaint has not been handled effectively you can contact my supervisor Dr Cheryl Brown, [Cheryl.brown@uct.ac.za](mailto:Cheryl.brown@uct.ac.za), 021 6505035

## Appendix C: Questionnaire

Age.....

Home Language.....Matric School.....

Degree Program

Faculty

Are you in UCT Residence? (Please Tick)

Yes	no
-----	----

If yes, where is your home (Where do you come from?)

If no, where do you live?

Suburb

Do you have access to computers and the Internet off- campus?

YES	NO
-----	----

If yes where and what type.

Do you own a mobile phone?

Yes	NO
-----	----

What type is your phone?

Please tick the applications that you use on your phone from the following list

Internet	
Facebook	
Twitter	
Whatsapp	
Blackberry messenger	
MySpace	
Other	

Would you be interested in being involved in 3 in depth interviews spread out in the year which involves understanding your detailed use of ICTs especially your cell phone, and potential online observation as well as social network observations?

If ,Yes. Please write down your mobile phone number.....

## Appendix D: Interview Schedule

Tell me a bit about yourself?

Where are you from (note urban/ rural background - language), where are you living whilst at university?

Where did you go to school? Distance?

How many are you in your family?

How many people in your family have been to university? What course are you doing?

Why did you choose that line of study? Why Sciences?

Are your parents in science related fields? What do they do?

Does your family own a computer/ cell phone? If so who, what, how many etc?

What does it feel like to be a female science student at university? Do you feel boys are more comfortable in sciences than girls?

Do you feel that first year male students are more adept at using computers than girls?

How long have you been using ICTS for?

When did you first start learning to use technology? Can you tell me more about that? Where were you when you first started to learn? With whom? Why?

When you came to UCT did you attend the computer literacy course?

How was the course and experience for you?

What do you use the computer for? Use computers for academic purposes, e.g. searching for information, using, PeopleSoft, Vula, Library databases and E-journals?

What do you find easy to do? What is difficult?

Do you sometimes seek assistance in the computer labs?

Which lab do you normally use? Why?

Do you ever ask someone else to get info from a computer for you eg. Download, print, check e-mail etc.

Do you feel that the use of ICTs at university makes your academic experience easier or harder?

Which ICTs are most important to you?

What ICTs couldn't you do without? Why?

When did you first own a cell phone? Why?

What do you use your cell phone for? Socially, studying

Do you sometimes use your cell phone in place of a computer?

What is something you do every single time on your cell phone?

What is the first thing you do on your cell phone every morning?

Which applications do you mostly use on your cell phone? Why?

Do you ever use your phone in a lecture? To study? How?

Who do you ask if you have an academic problem?

Who do you mostly connect with (chat with) on your cell phone applications? Friends? Family? Why?

Do you sometimes use your cell phone to connect with classmates? Which applications do you use?

Because you are away from home do you use any of your cell phone applications to connect with your family/ friends back home?

Do you sometimes chat about UCT life with family/ friends who are back home?

Does your experience with your cell phone help you when using other ICTs?

On twitter do you follow an academic related person e.g a Lecturer or a scientist?

Do you think your cell phone sometimes distract you from your school work?

What technology would you like to buy in next 6 months?

How much would you spend on computer/cell phone?

## Appendix E: Precious's Interviews

### Interview 1

I am Mmabatho and mmm I am from Kimberly, I stay with my grandparents umm, I am a child of two, like my mother only have two children, and my brother he is 21.

When did you first use technology?

Mmm the time I got introduced to technology was in grade 4 ahh we used to have this computer thing at school and they were all encouraging us to do it and then..... That was the first time that I got to use a computer,

And your first cell phone

I was exposed to cell phone but I didn't get to use them

Why the interest to study Sciences?

Though my mark were good in sciences when I was in primary school, when I got to secondary they were still the same there was no change, my brother was so science based, and he would always mm sciences there is so much money in the sciences and stuff like that (laughs) and then but I met this other teacher, he was so passionate about sciences and stuff like that and he really encouraged me, like to engage in sciences and to like take a science career and stuff like that, and Jaa i basically enjoy the sciences so thats why I am in the science faculty.

Where do you stay in Kimberly?

Its jaa, its a location, but it's not rough its very calm and quite.

Do you have computers at home?

No I don't have it's my brother who has a laptop

Why did you choose to study at UCT?

In Kimberly there is like Unisa, no the thing is I applied to UFS, but then the thing is I wanted to go away, not that I hated home, noo, but I always wanted to go away. You know Bloemfontein is the second version of Kimberly, you get to meet the same people, so I applied to UCT and then UCT accepted me and I was like I will choose UCT over UFS, UCT is the best University in the country (Shrugs her shoulders).

And how has been your experience of UCT?

I thought it was going to be all work and no much time for fun but (laughs) the environment is so nice.

Do you feel boys perform better in Sciences than girls?

For me its not like that , for me everyone is the same, No boy is going to say haikho man, sister coz no-one is going to like undermine you coz, she might know something that I don't know so I just can't undermine like that . I have never seen anyone in the lab like whatever you are doing whatever like undermine my work like that, like we always work together and help another stuff like that Jaa.

Do friends ever question you for being in Sciences?

(laughs) People always say like why you did that to yourself

Did you use computers in high school?

Oh at my school we had like a subject that was more like into basics but I just didn't choose it, I just did geology over it. But after that I did a computer courses, like I did whatever they were doing, but I did it after I had matriculated, I even got a certificate everything.

How was the Computer Literacy test at UCT?

Yoo, I think like some questions you know what they are asking but we just don't know, but you must remember that thing is supposed to be like that but you don't know how to go about stuff, and stuff like that, but it was fine?

How has been your experience of computers in learning?

(Laughs) At least no essays in sciences but in Bees we even research and do databases. The thing is like when you go to Microsoft words its easy but now its excel. Its Yoo its struggling man (laughs)

What's the most important technology for you?

Cell phone, yes it's portable

What do you do almost every time on your phone?

Mixit

Do you use your phone in the lectures?

In the lab you can't, you always want to but the demi is like no cellphone, and in the lectures we don't record because sometimes they do record and then you get them on Vula.

Can you access Vula on your Cell phone?

Some people get vula emails

Which labs do you normally use

PD Hahn Labs and also Baxter lab, like the computers there are fast like when you go to other labs, it will take too long to get to Vula, like they are too slow they keep logging, logging, it's like PD Hahn they are fast.

Do you ever ask for assistance in the lab?

I never ask for assistance coz you know what you are doing, (laughs and shrugs her shoulders)

Do computers help you in your school work?

They make life easier

Do you use any application on your phone to connect with family and friends?

I use Mixit more because that facebook eats my airtime, and then I become broke, I go to the lab to use facebook, but then my phone I use mixit all the time.

Do you sometimes chat with classmates about you schoolwork?

We do talk about fine sometimes, what we do outside school.

Do you chat about UCT academic life on you applications?

We do always even my educators, I have them on facebook and then we will chat and we talk and they are like how is school and I say mmm it's difficult

Do you think your cell phone helps you with the use of computers?

Yaa a little

Are you on twitter

Noo

Does your cell phone sometimes distract you?

Yes I do like sometimes you will be like from a lecture nee, and you are on facebook, when you get home obviously you have to put it away and like ok I gonna start studying and then you say okey I gonna chat for 30minutes and that's the problem I have I will chat for 30minutes, 30 minutes, 1 hr and that's the problem I have, But now that I am getting serious now, i regret that this facebook thing ever happened. (laughs)

Whats the first thing you do on your phone in the morning?

Check my phone, like when you wake up hanta like maybe you are lying down you just wake up, so you reach for your phone maybe there is a missed call and you check it and then you wake up

So in the shuttle Do you use your phone?

Yoo but i never google a word ar anything in the shuttle, I always say I will do it home,(laughs) I chat with my friends

Which technology would you buy given the chance?

I will always want an Iphone Apple, the new one coz my brother has one, and it's like so big, it's like you have technology in your fingertips, it's like even if .... When you use it the messages is like very close, it's like nice, it's like even the pictures are here, it's like for facebooking, for everything its nice! (Screams with excitement) and costly ummm.

## Interview 2

Tell me how you used your phone during exams?

I smsed people like how should we do that or call someone how did you do that, ask questions stuff like that. Yes and you ask questions like how did you do that maths Jaa.

Which applications did you use to ask your friends questions?

I call people , I get smsses and I go on facebook with this phone Yes and mixit.

Did you express yourself on the facebook using your mobile phone during exams?

Yes I expressed myself a lot on facebook during exams and Jaa everyone would responded even yesterday I posted something about the chemistry practical, and everyone was like Jaa, Jee you can say that again, even people who are far away.

Did you get emotional support from friends and family during exams?

Do you think your phone helped you to adapt to university life in the first semester?

Shoo my phone is outdated but, I do use it and since I am here I use it a lot I use facebook and I also go the labs Jaa

How are your computer skills now compared to your first few months at university?

Yes I much better, like at least practice makes perfect and like the more you use it the more you get used to it , Jaa

Have your mobile phone helped you transition into computer based learning?

I am moving away from my phone, I really need to because, Jaa sometimes it's disturbing I don't have problems with it if it's for fun like listen to music on it Jaa.

My computer skills have improved because I am more attached to my computer now, because I have detached myself from my phone, it has really helped my computer skills

Ish I don't know like for me, I don't have a problem am not into blackberry because you know awith blackberry, whatever you need d to do like you go to your phone and everything and everyone is thewre, I feel it will disconnect me from other stuff like... I am actually planning to update my phone nany time soon, actually my grandmother wanted to buy me a blackberry like for beginning of second semester but I said no its fine, stuff like that and , but when I upgrade I won't upgrade to blackberry coz blackberry has a lot of stuff.

I just want a phone that access the internet much easier because now I do on my phone but its slow. I just want one where I can easily like check my emails and go through stuff like that

## Appendix F: Fudge's Interviews

### Interview 1

Tell me a little about yourself

I am also from Kimberly but I didn't know xxxxxxx, and I call were i grew up the woods, like in the woods, I don't know why but its not really the woods. I live with my mother, my grandmother, I am the only child, but I have cousins I live with so then they are like my brothers: so its like the four of us.

So is it a rural or urban setting?

I live in a location, near a bottle store so it gets rough

Why did you decide to go for sciences?

I just like sciences (laughs) making bombs no not for killing anyone, and I like chemicals and putting things together finding results. I just think science is nice, it's interesting, and since the way we are made, we are all science

But what do people say about you being in sciences?

People are like uuu-h sciences! (Shaking her head)

Do you feel male are more comfortable with sciences than females?

We are equal and at the same level, we just help each other

Why did you choose to study at UCT?

To be away from home and to experience a new environment and people and UCT is like the best university in the country

Does UCT meet your expectations?

Yoo I had high expectations for UCT, I thought I gonna work all the time, no sleeping, no time. When I came I knew I was going to be focused (laughs) I thought I was not gonna laugh at all, Ok maybe that's a little dramatic, but that's what I expected, But the environment is like wow, I like it.

When did you first use a computer?

I was never interested in technology but there were computers at my primary school and we were exposed to them and we used them but they were just not interesting to me in and, Jaa in secondary they were also there.

Does your family have a computer at home?

No we do not have

Did you do the Computer Literacy Course at UCT?

Yoo jaa, tough but fine

When did you have your first ever phone?

Like in primary grade 6 like my nice phone

How has been the use of computers for learning at UCT?

The good part is we do not write essays (laughs) but we have done two essays in BEEs which is like Geography with Biology. Ok, shoo but Excel is tough

Do you ever ask for assistance in the computer labs?

I never ask (shakes her head and laughs)

How is it living off campus without access to computer labs and the internet?

It's hard, jaa but I live near medical school so I go to their labs

How has been the use of computers for learning for you?

It has made life easy especially for communication purposes

Which technologies do you own?

Cell phone and TV

And what is the most important technology in your life? And Why?

Cell phone, Jaa, you can go on internet with your cell phone, go on TV, it's like everything in one. You can use your phone in place of a computer.

What do you do almost all the time on your cell phone?

Facebook, Jaa facebook

Do you use your cell phone in lectures?

No-o but you can go on Vula on your small phone though it's small

So do you use social networks to connect with family back home?

Yes besides facebook I have my Aunt on BBM mmm my brother, so Jaa

And do you chat with your classmates and friends on these social networks?

We do

Do you ever chat about UCT and your academic life?

Yes always , I always do

Can you say your phone sometimes distracts you?

Noooo sleep distracts me not my phone (laughs)

What is the first thing you do on your cellphone in the morning?

Check for missed calls? (laughs)

### Interview 2

Tell me how you used your phone during exams?

When I was studying I took pictures of stuff and I recorded myself reading a text and then I would listen to myself on my phone with ear phones Jaa

Which applications did you use to ask your friends questions?

I asked my friends questions on BBM, at one time I asked a friend a question on facebook via messages but she took forever to reply

Did you express yourself on the facebook using your mobile phone during exams?

Jaa I always write on my status like, maths is giving me stress and people respond to me and they say like , hang in there and some of them are like Jaa, maths, so yes I get a lot of support.

Did you get emotional support from friends and family during exams?

I got support mainly from my aunt on BBM, so she would ask how you are doing and stuff jaa and my grandma has whatsapp now.

Do you think your phone helped you to adapt to university life in the first semester?

Yes I would call my family and friends, tell them how it's going and they would support me, um I can express whats going on in my life via facebook, take pictures with my phone and share them and people can always respond and support me on university and stuff

How are your computer skills now compared to your first few months at university?

I don't know cos there is like a lot I still don't know on my laptop, even If I upload a new programme I don't know how to because I don't know to use it, cos I have windows 10 now which I got from my brother and I need help with it even the basic stuff.

Have your mobile phone helped you transition into computer based learning?

Since my blackberry keyboard is the same as computer keyboards I know here the letters are and so I can type faster now Jaa. I use my laptop more now , so cos I am now in residence so its easy to connect to internet and stuff. Like this Khan academy I can go on internet and get stuff. But my cell phone I cant live without without my phone It will always be my phone

## Appendix G: Bianca's Interviews

### Interview 1

Tell me a bit about yourself?

My background mmm... I am the first born mmm in a family of 5 children, back in Durban. I am the only girl and there are four boys, mmm, So like I am the eldest

Where are you from (note urban/ rural background - language), where are you living whilst at university?

I live in like a semi rural area like a semi location called Isibingo; So aah what else? Here i am in res.

Why did you choose to study at UCT?

Basically, its like, I like meeting new people, new friends and having new experiences. I like UCT it's so nice

Where did you go to school?

Clairwood Secondary. It's like close to my location

How many people in your family have been to university? What course are you doing?

Since, like I am the eldest, I am the first, ah two of my brothers are in high school, and the twins are in primary?

Are they science oriented?

*Not at all (Laughs) they all have other different personalities*

Why did you choose Sciences as a line of study?

Basically like anything you are doing ,the teachers they are like motivating you and also like the fact that, you are always noticing male teachers teaching science subjects and everything, and it means you are thinking liker, why not have a woman teach sciences, like in textbooks you always see like scientist like Einstein, whatever, it is always like white man (laughs) and I was like why not female scientist, why not be the first girl , the first black girl in a physics textbook rather than a magazine.

Are you parents in science related fields? What do they do?

Aa (laughs) my parents are nowhere near sciences, My mom is unemployed and my dad is just working at Fidelity.

Does your family own a computer/ cell phone? If so who, what, how many etc?

No not at home I have a laptop here in res.

What does it feel like to be a female science student at university?

People are like yo! girl why are you killing yourself. (laughs)

Do you feel boys are more comfortable in sciences than girls?

(Shakes her head) For me its like the same

When did you have your first ever phone?

Waal, when I was in grade 7, I used to call Mom

How long have you been using ICTS for?

There were computers even in my primary school.

When did you first start learning to use technology? Can you tell me more about that? Where were you when you first started to learn? With whom? Why?

In primary it's just that I never had interest in technology, it's just that I was not that good in computers but there were computers

When you came to UCT did you attend the computer literacy course?

Yes

How was the course and experience for you?

It was tough but fine( shrugs her shoulders)

What do you use the computer for? use computers for academic purposes, e.g. searching for information, using, PeopleSoft, Vula, Library databases and E-journals?

Though its not much we use them in the Bee course were we research and write sort of essays

What do you find easy to do? What is difficult?

Ms word is like Ok, but Excell (shakes her head) not easy

Do you sometimes seek assistance in the computer labs?

Yes I do, if like I am struggling, I ask the demis in the lab

Do you ever ask someone else to get info from a computer for you eg. download, print, check email etc?

No I have my own laptop and can use the res lab

Do you feel that the use of ICTs at university makes your academic experience easier or harder?

Easier , yes easier

Which ICTs are most important to you?

My cell phone

What ICTs couldn't you do without? Why?

My cell phone because its portable

When did you first own a cell phone? Why?

My first phone was in grade 6, just for calls, ah, it didn't have much applications and I didn't know much about cell phones until I got to high school and had friends with much better phones, I got to use my friend's phone like I got to know, like, use other applications via cell phone.

What do you use your cell phone for? Socially, studying

Yes, both, especially social

Do you sometimes use your cell phone in place of a computer?

Yes like go to the internet

What is something you do every single time on your cell phone?

Call home! (laughs)

Do you connect with any of your friends through social networking applications on your phone?

Yes, but I use facebook more than Mixit, I only have like my cousins on my facebook.

Do you chat with your classmates and friends on facebook?

We do sometimes

In relation to ICTs do you think your cellphone has helped you to familiarise with the computer?

Partially I still find problems with computers

Do you feel your phone sometimes distracts you from your school work?

Noo

What is the first thing you do when you wake up in the morning?  
Jaa check my phone.  
Given a chance to buy a new technological tool what would you buy?  
Mm I phone

## **Interview 2**

Tell me how you used your phone during exams?

Which applications did you use to ask your friends questions?

Like umm during when I have a question sometimes I just can't get the message coming across from the passage or the book I am reading I will just google the stuff on my phone. I have ferriends in res so like I just call them Jaa like can we meet up.

Did you express yourself on the facebook using your mobile phone during exams?

I used to have a problem like, I am not so into writing a status on facebook because I feel like if I write something people will think I am full of myself or do they care, but I do write on my status sometimes.

Did you get emotional support from friends and family during exams?

Like I wouldn't write on status but I wouldn't write private messages to individuals on facebook and Jaa, they would provide the emotional support that I need.

The main support I got from my phone was emotional Jaa from my family and friends

Do you think your phone helped you to adapt to university life in the first semester?

Yes coz like everyone is a dial away when I am with my phone

How are your computer skills now compared to your first few months at university?

I have got the hang of it but like since I am like a bit ba-aad with technology I just use it when I need a break coz it's like when I need a break or when I need to find my way around or a lecture venue has changed what what so I go on Vula check my emails and just read upon what's new or what's happening etc, and on my facebook I just go online check what's going on in other peoples' lives, and what I am missing out Jaa

Have your mobile phone helped you transition into computer based learning?

Not for me, coz like my phone model the keyboard are not the same as the computer, but the computer is not that bad anymore but I still need to know a lot of things.

How important is your phone now compared to computers?

My cellphone is still the most important technology in my life.

University of Cape Town

## Appendix H: Faith's Interviews

### Interview 1

Tell me a bit about yourself?

Umm, I am....., right, and I am from Limpopo like you said, Jaa, I come from a family like of its like 4 kids and I am the first born

Where are you from (note urban/ rural background - language)

And I live like it's in rural areas obviously and I speak Sepedi Jaa.

Where did you go to school?

The name of my former school is Mulaudzi, Jaa

How many people in your family have been to university?

Jaa my mom went to university of Venda in Limpopo and no (laughs) she actually did teaching but then she went into teaching but she didn't like teaching so she left coz she didn't like teaching. Yes she has a degree in teaching.

Why did you choose this line of study? Why Sciences?

Joo (laughs) science is interesting, its more challenging, actually I love the challenging stuff, I love to be challenged, then if something is easy for me (shrugs her shoulders) Jaa my teachers encouraged me they just saw that I love sciences and I love Maths a lot, sooo.

What does it feel like to be a female science student at university? Do you feel boys are more comfortable in sciences than girls?

Actually that's true, but at my side, like, I never let any guy bit me, I was always the best gfrom grade 8 to grade 12, I made sure of that, and people are always like why are you in Sciences, Jaa but here it's not the same but n computer science you find that there were more boys than girls actually when we started, I think we were like 3 girls but then some came from the mainstream class.

Are you parents in science related fields? What do they do?

No no they do other things

Why did you choose UCT?

Joo (laughs) UCT is like the best, no like the thing is like I always want to come to UCT, and the most challenging part, ok, like the most amazing part is that I only applied yo UCT and got accepted at UCT Yes (laughs)

Is UCT what you expected?

It is a lot more, and the support, Jaa I really appreciate the support that I get especially from my lecturers its really cool.

Does your family own a computer/ cell phone? If so who, what, how many etc?

No, no like the issue of computers is that i never had the chance to be with a computer before I came here and like Jaa, It was very challenging for me because, I actually chose computer sciences, and actually I didn't know what it was all about (laughs) but because I love challenges Jaa, I thought I will find out what it is all about and it turns out to be a lot more interesting and thats what I am going to major in next year.

Do you feel that first year male students are more adept at using computers than girls?

Yes, mmm, Jaa, Jaa,

When did you first start learning to use technology? Can you tell me more about that? Where were you when you first started to learn? With whom? Why?

So like I went to a school that didn't have you know, that actually did not have much technology, you know technology is not that OK, you know, so it's like, when I look at my school comparing to the situation which is at UCT it's not like Ok, it's so not OK, because I feel so low in terms of status and where I come from and Jaa, that's it

When you came to UCT did you attend the computer literacy course?

Yes

How was the course and experience for you?

Joo, it was really hard (laughs) but Jaa I am getting used to it and my mom just got me a laptop

Do you sometimes seek assistance in the computer labs?

Yes I do yes.

Do you feel your computer skills are improving at university

Yes, but if I had used computers since primary Joo it would be such a difference (laugh)

Which ICTs are most important to you?

My cell phone, Yes, I own blackberry, blackberry is nice.

Jaa, my cellphone is more important, Jaa, it suits more, like it's easy to carry, Jaa like If I wanna call somebody, I just like do the thing, straight forward.

When did you first own a cell phone? What were you using it for?

I think grade 8, nothing it was just ah, calls and sms.

What do you use your cell phone for? Socially, studying

(laughs) Waal actually I just use it for whatapping, facebook and all these things. And yes, I google stuff and I whatsapp to ask schoolwork questions to friends, classmates, Jaa.

Do you use facebook to chat about UCT life with friends and family?

(laughs) Yes I do and they always ask about UCT

What is something you do every single time on your cell phone?

Joo, isshh I think it would be between Whatapping and SMS

What is the first thing you do on your cell phone every morning?

(laughs)Actually, check the time

Which applications do you mostly use on your cell phone? Why?

Whatsapp. I use it to chat with friends back home and my former educators.

Do you ever use your phone in a lecture? To study? How?

No, never in a lecture, but I can use it to study Yes, Jaa like you know, when we discuss something on whatsapp when I am studying I can even go back to that message and check for it, jaa

Because you are away from home do you use any of your cell phone applications to connect with your family/ friends back home?

Does your experience with your cell phone help you when using other ICTs?

Do you think your cell phone sometimes distract you from your school work?

Joo, (laughs) no maybe sometimes, unless facebook, but not all the times, I can control it, I am very disciplined?

What technology would you like to buy in next 6 months?

Umm(pause) what else, maybe a printer, Yes Ummm, I don't know, I don't know

## Interview 2

Tell me how you have used your cell phone to support your studies so far?

Ok, you find like umm when I was preparing for exams umm, most of the times if I had a question I would use Whatsapp obviously coz it is was just there and I would use Whatsapp to communicate with my friends and with my classmates obviously jaa, so if I forget something I just ask. I also use google mostly on my phone especially in chemistry

And Facebook? Do you ever use it for academic purposes?

I do it everyday and we do use it Jaa especially in Comp Scie. It is the main thing but we just inbox each other on facebook not on the wall. Jaa

Do you ever express yourself on your facebook wall?

Sometimes, but aye, I do not like doing that I think its so revealing (laughs) unless I inbox somebody about how I feel?

And BBM?

I am not on BBM

During vacation which applications did you use to stay in contact with your friends?

Whatsapp I prefer to use my data bundles for Whatsapp than facebook

So there would be nothing about your studies on your facebook wall?

Sometimes but even if I don't have anything on my wall I would still inbox people for academic or emotional support, I always inbox my aunt on facebook and she helps me when I am low

How are your computer skills now?

It's very good and improving, very good. I can use my laptop now actually I just love Comp Scie, I like it.

How were you able to advance so quickly with a tool that you had never seen prior to UCT?

I think I find it more interesting and Yes, I spend most of my time doing it. I dedicate most of my time to Comp Scie?

Has your typing speed improved?

Its good, its improving because I started like just fresh this year. My phone has helped me because you know like the keyboard n my phone is more like the computer, so like I started with it, they are more like similar so my speed in typing has improved

Would you attribute your quick transition to computer use to your chosen field of specialization, Computer Science?

You know I never had any computer experience or anything like that so like when I was introduced I didn't like say no, this is nonsense, I actually realized that it's quite cool.

And during vacation were using your laptop extensively?

I was actually teaching my Dad how to use a computer!

How has it been for you to have all these technologies at your disposal, your phone, laptop and computer labs?

Its actually good, you find that I spend most of my time on my time on my laptop, it's either I am in front of a computer or my laptop, that's what I do. You find that with everything I need a website to search for something and also for computing, I need my laptop.