UNIVERSITY OF KWAZULU-NATAL

Managing the challenges of digital divide among first year students:
A Case of UKZN

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A dissertation submitted in fulfilment of the requirements for the degree of
Master of Commerce
(Information Systems & Technology)

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2019

DECLARATION

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ACKNOWLEDGEMENTS

Firstly, I would like to thank God for granting me the grace to start and complete this study. Also, for carrying me through the difficulties I encountered during the course of this study. It would not have been possible without the gift of life He has bestowed upon me.

I would like to express my sincerest gratitude towards Dr. Nurudeen Ajayi for his guidance, continuous support and “patience” that has contributed into my academic research journey. My deepest appreciation also goes to Mr. Rushil Raghavgee for his immense knowledge, open door policy and continuous motivation. Both your insights as my supervisors have stretched me and has allowed my research to extend from various perspectives. Your time and inputs are invaluable.

Special thanks to my parents, Dr. & Mrs. Faloye. I am grateful to have achieved your endless support, inspiration and prayers throughout my study. I would like to thank Dr. Richard Ogunnubi and wife Dr. Olufunmi Faloye Ogunnubi for being my backbone from the inception of my studies in UKZN till date. Also, I would like to thank Prof. Irene Govender for providing me with opportunities within UKZN.

My siblings, Ope and Tosin, thank you for your continuous words of encouragement and for those extensive phone call conversations. To my friend Victor Faniran, thank you for always availing yourself whenever I needed research assistance. Last but not least, to my special friend Nothando Ngwane, your efforts are appreciated.

ABSTRACT

The integration of technology into the educational system has brought about changes in the style of teaching and learning. Nowadays, institutions are adopting technologies such as computers and the Internet to enhance their teaching and learning activities. Students that grew up using computers and related technologies are often at an advantage with their learning because they would have developed the skills required for using technological resources to enhance their learning. However, students that have not been exposed to any form of technology are often at a disadvantage with their learning because they often lack or do not possess sufficient technological skills. The disparity between students that have been exposed to technology and those that have not, is often referred to as digital divide. The literature shows that the digital divide is a challenge that is impacting on students' academic performance. This study was therefore conducted to understand the challenges faced by the first-year students of UKZN with regards to the digital divide.

In this study, a quantitative research methodology was employed. The findings of this study show that students with little or no exposure to technology prior to joining the university often face challenges that include the use of application programs (e.g. MS Word, Spreadsheet), downloading of informative materials, conducting online tasks and navigating the Internet. The findings also show that time of access/ownership to technology (before or after joining the university), technology skills and computer anxiety affects student's computer self-efficacy. However, the study's findings also showed that irrespective of student's exposure level to technology prior to joining the university, students are faced with the university's technological challenges that include insufficient technological resources (e.g. printer, computers, scanners), power interruption, poor Wi-Fi connectivity and lack of technology assistants.

Based on the findings in this study, it is therefore recommended that universities organize frequent orientation and IT training programs for first year students. Such programs should focus on the effective use of technologies for learning purposes. In addition, universities should ensure the availability of administrative and technical support whenever students are performing technology related learning tasks. Furthermore, universities should setup a team that will focus on continuous monitoring of whether students are coping with technology or not. This team should also evaluate the available resources on monthly basis to identify the possible or required maintenance.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

APA - American Psychological Association

MOOC - Massive Open Online Courses

BL - Blended Learning

ICT - Information and Communication Technology

EL - Electronic Leaning

DD - Digital Divide

DI - Digital Immigrant

DAD - Digital Access Divide

DSTV- Digital Satellite Television

PPV - Pay-Per-View

DCD - Digital Capability Divide

DOD - Digital Outcome Divide

USA - United States of America

IT - Information Technology

NTIA - National Telecommunications and Information Administration

UI - User Interface

OS - Operating System

HCI - Human Computer Interaction

SE - Self Efficacy

PLATO - Programmed Logic for Automated Teaching Operation

TAM - Technology Acceptance Model

UKZN - University of KwaZulu-Natal

PMB - Pietermaritzburg

CBT - Computer Based Test

CBA - Computer Based Assessment

PC - Personal Computer

PDA - Personal Digital Assistant

LMS - Learning Management System

MIT - Massachusetts Institute of Technology

SDL - Self-Directed Learning

TL - Technology Literacy

CL - Computer Literacy

DL - Digital Literacy

PEOU - Perceived Ease of Use

PU - Perceived Usefulness

LAN - Local Area Network

SPSS - Statistical Package for Social Sciences

CHAPTER 1: INTRODUCTION

1.1 Introduction

The emergence of the Internet and other forms of technology has reformed the ways in which individuals, organizations and governments communicate, disseminate, and manage their information (Mikre, 2011; Pierce, 2019). Today's society is, however, still separated by the gap that exists between individuals with access to technologies and skills to use such technologies, and those without such access and skills. This gap is referred to as the "digital divide" (Burkhardt et al., 2003; Elbert & Alston, 2005; Broadbent & Papadopoulos, 2013; Datta, Bhatia, Noll, & Dixit, 2019). The digital divide is a prominent challenge affecting the individuals and organisations in developing countries, just as much as in the developed countries.

As for the developed countries, the digital divide is still a challenge because large segments of these countries are still faced with the challenge of digital divide, even though they are considered to have high technology availability (Ragnedda & Muschert, 2013; Lussier-Desrochers et al., 2017). Developing countries are also faced with challenges which include, lack of technological infrastructures and insufficient modern technological innovations. As a result, such countries are at a disadvantage. Similarly, individuals who are owners of technology or have access and the skills to use technology are at an advantage over those that do not. This is because such individuals are capable of using technology to carry out their IT related tasks.

The Digital divide has been classified into three categories which are digital access divide, digital capability divide and digital outcome divide (Wei, Teo, Chan, & Tan, 2011; Berrío-Zapata, 2014). A digital access divide refers to inequalities in terms of physical access to technology, particularly hardware and software. A digital capability divide is concerned with the issue of usage and skills with regards to technology, while a digital outcome divide focuses on the variation in the outcome after an individual has used technology (Smith, 2015).

In recent years, technology has been introduced to students by learning institutions through online registration, e-learning, podcasting, etc (Dočekal & Tulinská, 2015). This introduction has made technology become an integral part of teaching and learning in higher educational institutions. It has also made it possible for students to be able to access study materials online and to make online submissions. However, it has also contributed to the digital divide among students (Broadbent & Papadopoulos, 2013; Barnidge, Diehl, & Rojas, 2019). This is because students who have not been exposed to technology prior to enrolling into a university tend to struggle in their learning process due to insufficient or lack of technological skills (Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010; Ritzhaupt, Liu, Dawson, & Barron, 2013; Calderón Gómez, 2019). This challenge has compelled the need to devise mechanisms through which the effect of the digital divide among the students can be managed.

1.2 Background of the study

The digital divide became prevalent as a result of the technological evolution and use of technology (J. Van Dijk & Hacker, 2003; Pick & Sarkar, 2015; Pierce, 2019). Despite the increase in the access and use of technology, studies have shown that there is still disparity in its access and use (Tarman, 2003; Fuchs & Horak, 2008; T. D. Oyedemi, 2012; A. J. van Deursen, Mossberger, & internet, 2018). The disparities in access is sometimes caused by the variations in individuals' level of access to technology. According to Cohron (2015), the individuals' skills and access to technology, particularly computers and the Internet, are sometimes determined by the income level, educational level, race, ethnicity and geographical location.

The need to enhance teaching and learning efficiency at educational institutions has led to emergence of different technology innovations that have been and are continuously being integrated into educational systems. One of such technologies was the Program Logic for Automated Teaching Operations (PLATO) that was developed at the University of Illinois. The PLATO project was developed with the focus of assisting teachers to design and deliver module materials (Chetty et al., 2018). In 1974, the International Business Machine (IBM) research center also developed a computer program, capable of teaching linguistic and scientific modules (Reddi, 2004; Garrison, 2011). These innovations brought fame to the use of technology in education. In addition, the use of technology in education has become a global trend (Reddi, 2004; Garrison, 2011; De Vries, 2018).

In recent years, there has been an increase in the adoption of technology into educational institutions. Some of which can be found in e-learning and Computer Based Assessments (CBA). E-learning facilitates the online delivery of lectures and study materials (Adikwu, Agunbiade, & Abah, 2017). It also allows students to communicate with teachers, and make online submissions of their school work (Garrison, 2011). Students who are familiar with technology due to their previous exposure often use such technological resources effectively for learning purposes, and as a result, tend to achieve better performance (Sun & Metros, 2011; Rashid & Asghar, 2016; Pierce, 2019). However, students who do not have technological skills prior to joining an educational institution may not perform very well in the use of such technological resources and consequently, in their studies (Sun & Metros, 2011; Broadbent & Papadopoulos, 2013; Rashid & Asghar, 2016; Pierce, 2019).

The first prominent survey to address the issue of the digital divide was done in 1994 by the National Telecommunications and Information Administration (NTIA) in the United States (Cohron, 2015). The findings in the survey showed that age, income level and geographical location are some of the key determinants of access to technology (Cohron, 2015). In recent times, however, research has shown that there has been a rapid reduction in the digital divide, possibly due to the pervasiveness of technology (Garrison, 2011; Cook & Polgar, 2014; Goncalves, Oliveira, & Cruz-Jesus, 2018). The pervasiveness can for instance, be seen in cellular phones that were traditionally mainly used for phone calls and SMSs. Nowadays, smartphones have become pervasive, allowing individuals not only to communicate but to search the web, use multimedia functionalities and for gaming purposes (Lavery et al., 2018b).

1.3 Research Problem

Technology plays a vital role in modern society since it impacts all facets of modern life. Its impact is perceived more at schools and tertiary institutions as it has been considered as a catalyst towards improving teaching and learning efficiency in educational systems (Dornisch, 2013). As IT skills become one of the core requirements for success in tertiary institutions, there exists a gap between those students who have and do not have the skills required to utilize the technological resources.

The digital divide emerged from the disparities between individuals who have access and can use technology and those who do not have (Waycott et al., 2010; Sun & Metros, 2011; Broadbent & Papadopoulos, 2013). This disparity has compelled the need for those who do not have technological skills to seek for such skills. According to Jones and Bridges (2016), the digital divide concept includes the “haves” and the “have-nots”. The “haves” are the individuals who own or have access to information technologies (Cohron, 2015). These are the individuals who are mostly benefitting from the prevalent digital age. The ‘have-nots’ are the individuals who do not own computers or have access to information technologies (IT). The individuals who are born in the digital age and have exposure to technologies are referred to as *digital natives*, while the individuals who were born prior to the digital age , yet adapting to the digital age are referred to as *digital immigrants* (Smith, 2015).

The digital divide does not only hinder students' access to institutions resources such as online library and module materials, but also denies them the opportunity to use the available technology at institutions of learning. The challenges faced by digitally disadvantaged students has necessitated the need to properly understand, from student's perspective, digital divide, its challenges, impacts on students and how the challenges can be managed. Such investigation will assist in devising adequate strategies to manage digital divide challenges, especially among first-year students and also enhance their technological skills. The research questions and objectives of this study are therefore aimed at identifying the challenges of digital divide among first-year students and propose ways by which its impact can be minimized.

1.4 Research questions

The following are the research questions of this study:

1. What factors affect students' computer self-efficacy (or lack-off), prior to joining the university?
2. What are the challenges faced by first year students in the use of technology for learning?

1.5 Research Objectives

The following were the objectives of this study:

1. To understand the factors that affects student's computer self-efficacy (or lack-off), prior to joining the university.
2. To identify the challenges faced by first year students in the use of technology for learning.
3. To propose ways in which the challenges of the digital divide can be managed, especially among first year students.

1.6 Significance of the study

The issue of the digital divide in universities cannot be over-emphasized, considering the dynamic nature of technology and its increasing use in academic institutions to support learning. This study proposes ways by which the issue of digital divide in institutions could be managed. Also, the study could provide academic institutions with the options that can help strategize, so as to support the technology immigrants that are entering the institution.

1.7 Scope of study

The study focused on digital divide and its challenges, impacts, digital literacy, technology integration in educational systems. One of the key areas where digital divide is prevalent is within academic institutions (Dornisch, 2013). Hence this study was conducted at University of KwaZulu-Natal (UKZN) Pietermaritzburg (PMB) campus. Additionally, this study was conducted among first year students because inequalities in technological skills exist among students, especially first year students (Castaño-Muñoz, 2010; A. J. van Deursen et al., 2018).

1.8 Justification

The integration of technology into education has made computers and the Internet become crucial components to modern day classrooms (Mikre, 2011; Broadbent & Papadopoulos, 2013; Chetty et al., 2018). The literature shows that there exists a gap, the digital divide, between those students who are digital natives and those who are not (Sun & Metros, 2011). Students who are familiar with using computers and Internet facilities for study purposes are at an advantage over those who have no familiarity. Those with no familiarity often struggle with their technology-related modules and as a result, have the potential to do poorly academically. To understand how digital divide can be managed within academic institutions so as to manage its impact on students' performance, studies that would investigate the digital divide and devise mechanism by which it can be managed are of importance. This study therefore provides academic institutions with insight that can help in addressing the issue of digital divide.

1.9 Methodology

To achieve the objectives of the study, a descriptive design approach was implemented. According to Bhattacherjee (2012, p. 93), descriptive study seeks to describe the characteristics of the observed phenomenon. The primary aims of a descriptive study is to give the detailed description of the crucial factors surrounding the phenomenon of interest. Ary, Jacobs, Irvine, and Walker (2018) stated that descriptive design tends to investigate whether some certain factors are associated with the phenomenon. In the context of this study, the descriptive design offered the researcher clear insight on the factors that contribute to the digital divide as well as how its challenges among the first-year students can be managed. According to Bhattacherjee

(2012), target population is the population from the study site which covers the total number of people under investigation. In the scope of this study, the target population were the first-year students of UKZN, PMB campus, of which there are 9741 students (PMB Campus).

The quantitative research approach which, according to Ingham-Broomfield (2014), is a technique for testing a proposed theory through examining the relationships existing between variables, was adopted in this study. In the context of this study, the researcher conducted the quantitative approach using questionnaires, and also, probability sampling strategy was implemented. According to Bhattacherjee (2012), probability sampling technique helps in eliminating sampling bias by giving every student in the target population a chance of being selected. In order to select the required sample for this study, a cluster probability sampling technique was employed. Based on the choice of sampling technique, the entire population was divided into separate group (cluster) and sample (simple random sampling) was drawn from each cluster. All the drawn samples combined together formed the final sample (370). Questionnaires were distributed in person to the participants to increase the probability of high response rate (Nulty, 2008). Prior to filling the questionnaires, respondents were asked to give their consent to participate in the study.

The study adopted two frameworks which are Digital Divide Framework, Wei et al. (2011), and Technology Acceptance Model (TAM) (Venkatesh & Davis, 2000). These frameworks offered the researcher a clear insight about the research questions that underpin the study. The digital divide model has three constructs namely digital access divide, digital capability divide and digital outcome divide (Wei et al., 2011). The constructs helped the researcher to understand the extent to which students had access to technology before joining the university and the specific technological devices that students are most familiar with. In addition, the constructs helped in investigating students' competency level in the use of technological devices. The TAM framework has two independent constructs, namely; perceived usefulness and perceived ease of use (Venkatesh & Davis, 2000). The two independent constructs were adapted to the study in order to understand the perception of students towards the use of technological resources for learning purposes. In this study, the perceived usefulness was used to investigate the extent to which students believe technologies such as computer, Internet are useful for learning purposes. The perceived ease of use was used to examine the extent to which a student believes he/she finds it easy to use available technological resources to carry out learning tasks.

Furthermore, in the context of this study, the use of technology resources by the student, for learning purposes is compulsory. Hence, the behavioural intention construct was not adapted to this study because the construct measures the likelihood or probability of using technology, whereas, in this study, the use of technology is compulsory. Also, the usage behaviour construct of TAM is directly influenced by behavioural intention (Venkatesh & Davis, 2000). Therefore, since behavioural intention was dropped, then its effect (usage behaviour) was also dropped.

1.10 Limitations

The research focused only on first year students and was carried out in one out of five campuses of the University of KwaZulu-Natal, because of the researcher's proximity to the campus and also, time and financial constraints. This affects the generalizability of the research findings. For a research finding to be generalized to the school, such research could use higher population, and samples should be drawn from each of the five campuses.

1.11 Outline of the Dissertation

This dissertation consists of six chapters. These chapters are presented in the sequence the study was carried out. A short explanation of each chapter is presented below.

Chapter 1: The chapter introduced the study. It presents a brief background to the digital divide and its associating factors. The chapter also presents the problem statement, research questions and objectives. A succinct explanation of the methodology employed was also provided.

Chapter 2: Presents literature review that has been carried out on the digital divide. In addition, studies on digital literacy, technology and student's academic performance and technology integration into the educational system were also reviewed.

Chapter 3: Explains the methodology employed to carry out the research. It also presents and explains the frameworks used in the study. Explanations on type of research design, research approach, sampling and survey techniques were also presented.

Chapter 4: Presents the results of the analysed data as well as the interpretations.

Chapter 5: Presents detailed discussions of the findings in this study.

Chapter 6: Presents the conclusion and the recommendations of this study.

1.12 Conclusion

In this introductory chapter, a short overview on the digital divide, problem statement, research questions and objectives were presented. An outline of the dissertation was also presented. It was ascertained that the Digital divide emerged from the disparities between individuals who have access and can use technology and those who do not. (Waycott et al., 2010; Sun & Metros, 2011; Broadbent & Papadopoulos, 2013). In addition, the digital divide has compelled the need for technological skills to be introduced into educational systems globally. The introduction of technical skills into the educational systems has also become important because technology has brought about a significant change to the teaching and learning approach in educational systems. Students who are familiar with technology due to their previous exposure and education are likely to use technological resources effectively for learning purposes. However, students who do not have such familiarities are likely to experience difficulties while using technologies. Therefore, a clear understanding of the digital divide and its associated factors would help in devising mechanisms to manage its challenges. Chapter two presents the review of literature conducted on the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The previous chapter presented an introduction into the study. It also presented the research questions as well as objectives, and also, the significance of the study. In this chapter, a review of existing literature on the digital divide is presented. This chapter also highlights the factors influencing digital divide, the digital divide challenges as well as its impact on students. Furthermore, the chapter presents a review of literature on digital literacy, technology in education, and the relationships between technology and students' academic performance.

2.2 Information and Communication Technology

According to Elirea Bornman (2016) information and communication technology (ICT) is described as any technological tool such as computers, smartphones, personal digital assistant and satellite that enable individuals to access, create, modify, analyze and exchange information. Hamiti, Reka, and Baloghová (2014) went further to state that ICTs are diverse technological tools that enable users to create, communicate, disseminate, store and manage information. Furthermore, Cardullo, Wilson, and Zygouris-Coe (2018) observed that ICTs are network devices, standalone computers and other telecommunication technologies with several modes of operation, capable of performing data communication and supporting interactive communication.

The dynamic nature of today's ICT is reforming the way individuals, societies, and academic institutions perform their various tasks. It is also causing a reality that is compelling the need for individuals to possess information and technological skills, which are considered prerequisites to be partakers in the present digital and technological world (Meyers, Erickson, & Small, 2013; Elirea Bornman, 2016). Nowadays, private firms and government organisations are in need of knowledge workers with adequate technological skills to carry out complex operations. Individuals who lack technological skills are at a severe disadvantage, especially in competing for such jobs. In addition, ICT is opening possibilities that allow individuals who are challenged by geographical barriers to learn. An example is the Massive Open Online Courses (MOOC) usually conducted in an online environment (Dočekal & Tulinská, 2015). These courses cover various areas and typically last several weeks. Some of the interesting features of MOOC include discussion forums which allows individuals to discuss and address questions among each other and with their educators. It is therefore perceived that, MOOCs provide individuals and professionals, who are faced with geographic challenges, with educational opportunities (Valentin, 2015).

ICT has changed today's teaching and learning approach through its interactive and dynamic nature (Garrison, 2011; Rashid & Asghar, 2016). The pedagogical activities in academic systems have now been subjected to various technological approaches such as e-learning and blended learning (Mikre, 2011). For instance, ICT, through the e-learning system, has made it possible for students to be able to access study materials online and to make online submissions. Several studies have showed that the effective use of ICT in schools offer student higher learning gains. For example, a study by Ziemba and Becker (2019) showed that students who utilize online computer tutorials for computer programming, mathematics and social sciences performed better than their counterpart who do not use such technologies.

However, in spite of the benefits of ICT in educational systems, studies have shown that there is disparity in terms of skills and access to technology. This disparity, often referred to as the digital divide (A. Van Deursen & Van Dijk, 2011; Olawande Oni, 2013; Elirea Bornman, 2016), signifies the gap between individuals who have access and skills to use technology and those who do not (Ritzhaupt et al., 2013). The issue of digital divide in the educational system in South Africa has been in existence since the apartheid era. Naidoo (2011); Newling (2012); T. D. Oyedemi (2012) Lavery et al. (2018b), indicated that during the era, there were no adequate provision for technology infrstructures and teaching resources in some academic institutions. This put students who had enrolled in such institutions at a disadvantage. The insufficient technological infrastructures remain a contributing factor of the digital divide. Furthermore, Berrío-Zapata (2014) observed that student background and geographical location play a crucial role in the issue of digital divide in educational systems. For instance, students from wealthy homes are likely to have developed basic technological skills. They are often therefore at an advantage to their counterparts who lack technological knowledge. This disparity, between student who have access and skills to use technologies and those who do not, has compelled the need for technological literacy for students, especially also, as ICT is increasingly becoming an integral part of educational systems.

2.3 Digital Divide

Several definitions have been given to Digital Divide, but most of the definitions revolve around the disparities of the individual's access, skills, and use of ICT. According to Peroni and Bartolo (2018), digital divide is the gap between individuals who have access and skills to use ICT and those that do not have such access. The author emphasized on the access, skills and use of information and technological tools such as the Internet and computers. Maketa (2007) and Dornisch (2013) highlighted in their studies that the advancement in technology has triggered the technological gap between people and has also compelled the need for technological skills globally. This is because technology has become a crucial tool for participating in today's global economy. It is also a requirement for self-development and social (especially online) interaction (T. D. Oyedemi, 2012).

Studies by Sun and Metros (2011), Broadbent & Papadopoulos (2013) and Smith (2015) indicated that the emergence of the Internet in the early 1990s brought about the information gap. Individuals who grew up using technology are referred to as *Digital Natives* (Prensky, 2001; Cronin, 2002; Crews & Feinberg, 2002; Nworie, Nworie, & Mintah, 2010; Waycott et al., 2010; Sun & Metros, 2011) while those that were not born in the digital era, but are adapting to the technological evolution, are referred to as *Digital Immigrants* (Prensky, 2001; Z. W. Goldman & M. M. J. C. E. Martin, 2016; Peroni & Bartolo, 2018; Chetty et al., 2018). The digital immigrants tend to struggle with technological tools due to the lack of basic skills to utilize technology, and as a result (in some cases) are lagging in the digital world.

2.3.1 Digital Divide Classifications

Digital divide has been classified into digital access divide, digital capability divide and digital outcome divide (Tien & Fu, 2008; Chikati, 2013; Peroni & Bartolo, 2018; Ziemba & Becker, 2019). These classifications are described below.

2.3.1.1 Digital access divide

Digital access divide refers to the inequality in terms of access to information technology (Chikati, 2013). According to Nyahodza, Higgs, and Science (2017), factors that influences digital access divide include peoples' educational and income level. Similarly, A study by Yu, Ellison, McCammon, and Langa (2016) shows that an individual with low educational and income level, living in an underdeveloped area and aged above 55, most likely lacks the opportunity to gain access to basic technology such as the Internet and computers. However, the issue of digital access divide in schools has been alleviated. This is because, efforts are being made by most countries in the provisioning of physical technological access such as computers and the Internet to students (Cox, Cheng, & Forbes, 2018).

Chikati (2013) indicated that before a user gains physical access to any form of technology, there often exist a motivation for such a user to have acquired such technology. In the same vein, the studies by J. A. Van Dijk (2006); Ghobadi and Ghobadi (2015) indicated that an individual's accessibility to technology lies on two factors, namely motivation and material. An individual's lack of such factors brings about digital access divide (J. A. Van Dijk, 2006; Ghobadi & Ghobadi, 2015). Peroni and Bartolo (2018) added that many of those who experience digital access divide, have motivational problems, which often result from their lack of exposure and awareness.

The term 'motivation' in the context of technological adoption is the wish to acquire any form of technology, and also technical skill (J. A. Van Dijk, 2006; Ramorola, 2013). Motivation to acquire technology is often associated with individuals' income level, as individuals with low income level are most likely unable to afford technologies (Ghobadi & Ghobadi, 2015; Santos, Sequeira, & Ferreira-Lopes, 2017). Digital access divide appears to be closing at a point whereby individuals are able to acquire a personal computer and have access to the Internet. However, digital access divide still exists because there are individuals who often avoid using technology due to technological anxiety even though they are financially fit (Riggins & Dewan, 2005; Saadé & Kira, 2009; Akin & Iskender, 2011). Similarly, J. A. Van Dijk (2006); Lavery et al. (2018b) found that, mental barrier also contributes to digital access divide.

Material factor on the other hand, entails conditions an individual requires to meet and the other tools an individual is expected to acquire before gaining complete connection or access to some form of technologies (Ghobadi & Ghobadi, 2015; Lavery et al., 2018b). The material factor is often granted in conditional manner such as subscriptions and pay-per-view. For example, the Internet and Digital Satellite Television (DSTV) subscriptions, allow individuals to purchase a decoder, open an account and make subscriptions. Access is granted after individuals have acquired the tools and also, when conditions have been satisfied. Although, income level, occupation and education are often associated with material factor (Nworie et al., 2010; Lavery et al., 2018b).

2.3.1.2 Digital capability divide

Digital capability divide refers to inequality in the skills required to utilize information technology resources (Elirea Bornman, 2016). These inequalities sometimes arise from socioeconomic statuses, family background and education (Tien & Fu, 2008; Cook & Polgar, 2014; Cohron, 2015; Nyahodza et al., 2017). Berrío-Zapata (2014) highlighted that the digital capability divide occurs due to the first level digital divide, lack of access to technologies and differences in individuals' technological skillsets. In the same vein, A. Van Deursen and Van Dijk (2011); Ballano, Uribe, and Munté-Ramos (2014) found that users who are competent and frequently use technology often differ in the style of usage to those who are new to the use of technology. Their findings further showed that users gain confidence and develop affinity towards the use of technology when they frequently engage in technology related activities especially the ones that involve the use of computers and the Internet.

As pointed out by Ghobadi and Ghobadi (2015), meaningful use of technology is determined by the available technological infrastructure and the individual's skillset. J. A. Van Dijk (2006); Chetty et al. (2018) further claimed that digital skill goes beyond operating computers and other technological tools. They stated that it involves the ability to search, select, process and apply information from a different source in a specific context. Waycott et al. (2010); Datta et al. (2019) in their studies, however, stated that, in the case of technological devices, individual skills are likely to increase with time. This is because, the frequent use of technological devices by individuals increasing and consequently bringing about strong affinity towards technology, and also in turn leading to high competency in the use of technology.

A. Van Deursen and Van Dijk (2011) categorized the concept of skills into operational, informational and strategic skills. The authors claimed that meaningful use of technology lies on the three skills. Operational skill is the ability to operate computer, network hardware and software (A. Van Deursen & Van Dijk, 2011). Informational skills entail the ability to use web-based search engines effectively, as well as identifying and processing the necessary information on all forms of technologies. Strategic skills, on the other hand, refers to the individual's ability to employ technology as a means of achieving goals and as a tool for participating in modern society. However, Leu et al. (2011): Ghobadi and Ghobadi (2015); and A. J. van Deursen et al. (2018) indicated that "digital skills" is succeeded by motivation to adopt technology. In addition, they stated that usage and skills are often shaped by individuals' educational and income level as well as family background.

Furthermore, Ghobadi and Ghobadi (2015) indicated that disparities in the use of technology emanated from the variation in the use of ICT applications for daily activities. A. Van Deursen and Van Dijk (2011) categorized the concept of ICT usage into active and passive use. Active use of ICT is determined when an individual makes a contribution to the Internet through media platforms such as blogs and online social networks. Passive usage occurs when technology is employed for a specific purpose (Montague & JieXu, 2012). For instance, in an e-learning system, students are passive users if teachers are sole operators of the technological resources. While students are also active users if they perform tasks using the computer and the on Internet. However, both active and passive usage of ICT is highly associated with individual's demographic attributes such as age, sex, income, and education level (Osterman, 2013).

2.3.1.3 Digital outcome divide

Digital outcome divide signifies the disparities in individuals' outcomes (e.g. academic performance and productivity) of using technology. The main concern of this level of digital divide is to understand and present whether individuals are familiar and have attained the required knowledge to use technology to carry out certain tasks effectively. As indicated by Wei et al. (2011), the digital outcome divide arises from the individual's ability or inability to effectively utilize IT. Therefore, each individual's digital outcome will vary. In certain circumstances, the digital outcome is also based on users' previous exposure and experience with technology (Sun & Metros, 2011; A. Van Deursen & Van Dijk, 2011; Wei et al., 2011). That is, the third level digital divide (digital outcome divide) would be influenced by the first and second levels of digital divide. This is because, an individual must have gained access to technology before they experience its benefits (the outcome). In addition, frequent use of such technology is likely to bring about a strong affinity towards the use of the technology which in turn leads to high competency in its use. Furthermore, in a study conducted by Alam, Imran, and People (2015), it was evident that in order to attain the characteristics of the third level digital divide, individuals need to engage themselves in giving meaning to the technologies they have access to. This is because the digital outcome divide is dependent on the way individuals engage themselves in technologies.

2.4 Effect of Apartheid on the Digital Divide

Prior to 1994 in South Africa, meeting the academic needs in the education system was highly dependent on racial stratification which was also based on the geographical (urban and rural) locations of schools (Nyahodza et al., 2017) . This stratification brought about unequal access to resources, which further caused inequalities in terms of basic technological infrastructures between schools across South Africa. Similarly, Nyahodza et al. (2017) indicated that the apartheid era promoted substandard education to some races. On the other hand, privileged races were provided with quality education. Swartz and Foley (1996); Sherer (2000); Newling (2012);Christopher (2018) affirm that university students that come from such underprivileged schools demonstrate inadequate information technology knowledge. This is because their prior schools did not expose their students to technologies, because they lacked the required financial resources for technology provisions. In turn, this becomes a crucial factor contributing to digital divide till date.

The social and economic inequalities that still exists amongst the racial groups provides an understanding of how the lack of basic infrastructure came into existence in schools across South Africa. The impact of unequal distribution of basic technological infrastructures across schools is, however, still prevalent, as can still be found amongst some of the university's first-year students (Motala, 2018). These inequalities also brought about stigmatized stereotypes relating to education and technology (Newling, 2012). For instance, the disadvantaged racial groups were often perceived to be lagging in terms of education, career, exposure and the digital world. Odunaike, Olugbara, and Ojo (2013) noted that the racial division caused an impact on students as they demonstrated lack of knowledge, in university, towards technology and adequate career guidance. Consequently, a number of these challenges stand to date and continuously remain a part of the major factors contributing to digital divide. However, the South African government is actively working towards liberating the disadvantaged races from the outcome of the apartheid era that occurred over two decades ago (Cox et al., 2018).

2.5 The Digital Divide Challenges

The digital divide presents challenges that became prevalent during the mid-1990's (Lavery et al., 2018a). This was due to the increase in the reliance on technology for everyday life activities. The growth in the usage of digital technology and the Internet brought about social inclusion, accessibility and academic performance challenges (Hill & Lawton, 2018). It is also believed that digital divide challenges stems from computer anxiety which in turn affects the student's academic performance (Scheerder, van Deursen, & van Dijk, 2017) . The challenges with digital divide that have been identified in the literature are:

2.5.1 Challenges with using a computer and computer input peripherals

In the studies conducted by Schneider et al. (2018) and Hill and Lawton (2018), it was evident that some students lack prerequisite computer background knowledge such as switching on a computer. Observation from the studies also showed that when students have to use the computer for their academic activities, they have anxiety due to their lack of familiarity of how to use the computer. Literature revealed that the main computer parts that have been challenging to use by students that have previously not been exposed to any form of technology devices are the keyboard and mouse. Students that experience the digital divide encounter keyboard challenges that relate to typing (Keengwe, Onchwari, & Wachira, 2008; Ritzhaupt et al., 2013; Lavery et al., 2018b). In most instances, the students fail to use the keyboard to accurately type out what they want to search for due to the unfamiliarity with keyboard. Also, searching for a site and typing the required website address (Uniform Resource Locator), becomes a challenge as students do not know how to insert punctuation marks such as hyphens and forward slashes for particular website names (T. Oyedemi & Mogano, 2018). This results in low confidence level towards using computer keyboards due to the many functions that students are unfamiliar with. Using a computer mouse also becomes challenging to students who experience digital divide. The challenge that students face is when the mouse pointer is frozen, students do not know that they can simply use the keyboard options such as Alt and F4 key to end the programs that are causing the mouse pointer to freeze (Nyahodza et al., 2017). In other instances, the pointer freezes due to several applications that are running in the background, that the student is not aware of. This is also a result of the student's unfamiliarity with the use of computers.

2.5.2 E-learning challenges

In universities, students are often challenged when using online learning systems due to their insufficient knowledge of ICT. One of the major challenges that universities encounter is the adjustability and adaptability of students that were previously technologically disadvantaged to the technology enhanced learning (Checchi, Rettore, & Girardi, 2018). According to T. Oyedemi and Mogano (2018), first year students fail to cope with the pressure of the technological change. Similarly, in a study conducted by Katoch, Doan, and Dadashi (2019) it was highlighted that first year students are challenged when having to use e-learning systems, such as Moodle, for learning activities as the such systems encourage independent work. This is a challenge because in secondary school, students are taught to work in collaboration and assist one another within the classroom (Z. W. Goldman & M. M. Martin, 2016). However, on LMS the concept varies as the assessments are individual based work that is completed and submitted independently by the students. In most instances, students are expected to know how to use the online learning site and are offered no support in the area of the online learning platform (Katoch et al., 2019). Students are therefore challenged when having to complete their online assessments as they are not technology inclined as a result of their unfamiliarity with technology. Furthermore, McGuinness and Fulton (2019) found that students encounter navigation challenges when using online learning platforms. In the same vein, Tuah, Herman, and Maknun (2019) indicated that students struggle to post in discussion forums that are held on the online learning system. Consequently, such students are hindered in the discussion participation and communication with the lecturer and fellow classmates. This difficulty is based on the challenge of students' inability of using computer input devices. As a result of lack of poor navigation capability, students further encounter challenges of how to download and correctly save learning material from the LMS.

2.6 Impacts of the digital divide challenges on students

The introduction of technology in universities has brought about challenges in the way that students conduct their tasks (Jerrim, 2018). Universities have also encountered concerns regarding how to equip students with the relevant skillsets that allows the students to be competent with technology usage (Buzzetto-Hollywood, Elobaid, Elobeid, & Objects, 2018). The continuous technology evolution introduces new learning patterns that create digital divide challenges among students. For instance, students become challenged with the use of learning platforms such as Moodle. This challenge reduces the possibility of obtaining better academic performances (Camerini, Schulz, Jeannet, & Society, 2018). It is believed that educational systems need to be restructured in order to accommodate the new digital world into all spheres of learning. This entails an understanding of the digital divide challenges that exist and further increasing the digital skills amongst students.

The implementation of different e-learning platforms has become a challenge due to the different educational backgrounds of first year students (Mahmood, Khattak, Haq, & Umair, 2018). This is considered to be a social problem being that some students are reaping the advantages of technology as compared to those students who are not (Robinson, Wiborg, & Schulz, 2018). This digital divide challenge impacts students as it brings about social divisions amongst those students who have technology skills and those that do not. According to Essien (2018), White students are more than likely to have owned computers as compared to the Black students. Although the Black ethnic group is growing in terms of computer ownerships and accessibility (Lavery et al., 2018b). The proportion of growth has not balanced across the different racial groups, and this has transpired into universities as White and Indian students show more competence with the use of computers and other technology resources as compared to their fellow Black students (Essien, 2018). The Black students encounter added challenges as they have to familiarise themselves with the technology as well as their academic workload. On the other hand, Doolan and Gilbert (2017) noted that psychological aspects such as socioeconomic statuses affect student's academic outcomes. For instance, students who do not know how to use resources, such as Moodle, affects their self-esteem as they consider themselves as failures. This in turn affects their academic performance due to lack of self-belief which is considered a psychological aspect.

Nowadays, technology has become a requirement at universities across South Africa (Nyahodza et al., 2017). For instance, at the University of KwaZulu Natal, it has been made compulsory for first year students to have laptops as part of the e-learning adoptions. In addition, the university also provides Local Area Networks and Internet connectivity to facilitate e-learning activities. As a result, first year students who have had no prior exposure to technology encounter technology disadvantages. This is because students who are familiar with technology manage to save time and are also able to adequately support their academic tasks. Additionally, the transition to the university's learning platforms, such as Moodle, does not become a challenge. Also, technology use of students, who fall within the digital divide gap, works to their disadvantage when it comes to choosing career choices that consist of technology. Whereas, students who were familiar with technology in high school are able to choose qualifications from various IT disciplines. On the other hand, it is believed that students who are challenged by technology encounter academic hinderances that further shape their decision making about the career paths they decide to take (Wu, Damnée, Kerhervé, Ware, & Rigaud, 2015). Furthermore, university's technology platforms offer broader career choices to students who enter university with technology knowledge (Elirea Bornman, 2016). For instance, students who have technology knowledge are knowledgeable to take on advanced technology career paths such as computer engineering and computer science. In accordance, Camerini et al. (2018) stated that students who have background knowledge of their chosen qualification tend to obtain better academic results. This suggests that, based on lack of technology exposure and usage, students who unfamiliar with technology are limited towards acquiring qualifications that consist of IT. Also, this means that students who take on IT careers yet impacted by digital divide, may not perform as well as students who have previous technology knowledge and exposure.

Digital divide has been understood to impact students' social life at universities. Over the years, due to the evolution of technology, students are continuously adapting to the different approaches to learning. According to Z. W. Goldman and M. M. J. C. E. Martin (2016) in universities, the majority of first year students aremillennials that are between the ages of 16 and 21 years. These students have demonstrated higher interests and aptitudes towards technology than the previous generation of learners. As noted by Mansfield (2017), post millennial students embrace the digital era since they prefer being taught and learning using technology approaches. For example, during lectures, post millennials no longer take down notes for later learning purposes, instead, they take pictures using their smart phones (Hill & Lawton, 2018). The flexibility of using technology allows for a balanced social and academic university life. However, not all post millennial students benefit from the advantages brought by technology as some students are not equipped to use technology for learning purposes. This impacts students who are not familiar with technology as they have to manually conduct learning activities that could be done through technology facilities. As a result, students who are not technology inclined have less social university life as they do not know how to use technology to capitalise on technology for their learning purposes.

2.7 Technological Adoption and the digital divide

In a study conducted by Francis, Ball, Kadylak, and Cotten (2019), it was argued that the adoption of technology brings about digital divide which often overwhelms those who are not adopting technology. In the same vein, Cheng and Yuen (2018) noted that technology adoption increases students' level of exposure. However, Iqbal and Bhatti (2015) noted that technology adoption is governed by market forces. This is because the early adopters purchase the technology at higher costs as compared to the late adopters. The individuals who purchase technology after some time period, due to the depreciation in technology, purchase such technologies at cheaper costs. Also, in a study conducted by Tsay, Kofinas, and Luo (2018) it was found that students who bring digital devices into the classes and also use learning management systems, have effortless learning experiences and more learning power. Despite the advantages provided by technology adoption to educational systems, there are several factors that hinder on the universities capability of fully adopting e-learning technologies. As a result, academic institutions encounter challenges as new learning systems are adopted, since some students have not caught up with the digital technologies.

According to Scheerder et al. (2017), the digital divide gap can also be caused by external factors other than technology adoption. For instance, having no access to the digital technologies is more than likely to cause a digital divide gap as compared to the adoption of technology. Additionally, the impact of no physical access to computers and the Internet are considered as the major catalysts that cause a digital divide gap. In most instances, the major digital divide catalysts are caused by individuals' socioeconomic statuses. In agreement, Gherardi (2016) noted that low income level individuals often lack Internet literacy due to financial constraints towards investing in technology. Furthermore, in a study conducted by Lavery et al. (2018a), it was affirmed that digital divide is caused by income inequalities. It was further discovered that students who had no prior access to technology experience the digital divide. This is because lack of access to technology limits the students' career, social and educational advantages. Also, in universities, students who are digitally excluded due to lack of access to technology demonstrate slow development towards information technology fundamentals. Mansfield (2017) in his study recommended that equal access to technological devices would lead to more technology adoption which in turn lessens the digital divide gap amongst students. Therefore, it can be argued that technology access and other external factors play the integral part to the emergence of digital divide. Students encounter the digital divide due to limited or no access to technology. Thus, adoption to technology cannot occur if students have no physical access to the technological devices. As a result, access to technology impacts digital divide. In addition, technology adoption is influenced by access to technology and does not directly influence digital divide.

2.8 Factors influencing digital divide

Over the years, authors have identified a variety of factors such as socio-economic status, age, gender, income level, geographical location and level of education as factors that contribute to digital divide (Murelli, 2002; Rooksby, Weckert, & Lucas, 2002; J. Van Dijk & Hacker, 2003; Ahmed, 2007; Fuchs & Horak, 2008; Hilbert, 2010; A. Van Deursen & Van Dijk, 2011; Naidoo, 2011; Olawande Oni, 2013; Berrío-Zapata, 2014; Cohron, 2015; Adhikari, Mathrani, & Parsons, 2016; Lavery et al., 2018b). A. J. Van Deursen and Helsper (2015) categorized the aformentioned factors and other related factors by different reseachers into four subgroups namely; digital technology, lack of infrastructures, individual attributes and geographical region. However, factors which include psychological, government priority, and urbanization were also identified in the literature as influencing factors of digital divide. These factors are discussed as follows:

2.8.1 Digital technologies

Digital technologies refer to technological devices such as computers, mobile phones, and application systems that use information in the form of binary computational codes (Johnston, 2017). Delello and McWhorter (2017) posited that understanding the nature of digital technology plays a crucial role when it comes to the issue of digital divide. This is because users, particularly adults, sometimes encounter difficulties while using sophisticated devices, consequently increasing the digital divide gap. Also, bad design of the user interface of some devices often discourage users from using technologies, and consequently influences slow adoption of technologies which further brings about digital divide (Feizi & Wong, 2012). Therefore, all the digital devices such as PC, computer and mobile devices should be evaluated based on their complexity level, interface, operating system, weight and multimedia. This inturn may guide the manufacturers towards producing non-complex, and user friendly technological devices.

In the study of Smith (2015), it was reported that perceived complexity of digital tools by individuals, and bad user interface are associated with digital divide. In the study, it was oberserved that adults who are 60 years and older prefer old technological devices due to the devices' simplicity, while some do not consider using technology. Obsevations from Mattsson, Tarrar, and Fast-Berglund (2016) studies also showed that individuals above 50 tends to avoid sophisticated devices due to their percieved complexity of such devices. Similarly, the study by Pick and Sarkar (2015) shows that the older generation preferred using old versions of digital devices such as desktops and mobile phones, even though they are capable and financially able to afford modern technology devices. Young individuals, however, especially students were reported to be using modern technology because of their exposure and competency in using such technology.

Adhikari et al. (2016) highlighted incompatibility issues between different technological devices as one of the associating factors of digital divide. In their study that focused on students' use of technological devices for learning purpose, it was shown that a certain number of students were unable to perform their learning activities during and outside classrooms because of incompatibility issues. According to the survey carried out in the study, responses from teachers showed that most learning actvities in the classrooms are being performed on iPads. These activities were solely designed to be compatible with Apple software. Consequently, other students using Android devices and laptops running a Windows operating system are at a disavanatge because the devices they own do not support the activities and instructions given by the teachers. Observation from the survey showed that some students expressed their grieviances towards being disadvantaged because teachers only talk about learning apps for ipads while such students only owned android devices. Adhikari et al. (2016) concluded that teachers should ensure uniformity in the classrooms with regards to the device for instructions in the course of learning.

On the contrary, observations from Liberman (2015) study showed that different types of technology offers diverse level of access . In addition, the author highlighted that good teachers should not count on a single device platform and method but multiple. This is because the use of different device platform for learning offers diverse access which inturn influences high learning gain.

2.8.2 Infrastructure

Infrastructure plays a crucial role in gaining acccess to technology because according to Meenakshi (2013), access to technology is made possible by technological infrasructure such as networks, electricity and data centres. It is therefore believed that the emergence of any form of technological innovation is the function of facilitating conditions, such as technological infrastructures. In Africa, some of the factors that contribute to the digital divide are the new technological innovations that are availabe and the lack of infrastructures. In developed countries such as America and Canada, some form of technologies such as ventilation on demand (VOD) has already saturated the market. Ventilation on demand is a system that monitors the quality of air and also regulate the room ventilation. Meanwhile, in some African countries such as Nigeria and Ghana such technologies have not yet been fully adopted due to insufficient or lack of technological infrastructures.

Naidoo (2011) Elirea Bornman (2016) are also of the notion that technology innovation companies often avoid investing in countries that do not promise larger profits as a result of lack of infrastructures, particularly African countries. This could be related to Nyahodza et al. (2017) study which showed that African countries are lagging in technological innovation. Ramorola (2013) went further, adding that there are vast technological innovations in some other parts of the world, but African countries are lagging. This is because African countries are yet to put in place an environment and infrastructure that triggers the interest of foreign IT innovators. As a result, African countries are experiencing a slow growth with regards to new technological innovation, a crucial factor influencing digital divide (Anyanwu, 2014).

Due to the affordability of mobile devices such as smart phones and tablets, access to the Internet has become a reality. The access to digital technology remains the prerequisite to such access and for participation in the digital world. In few cases, the level of digital access individuals have is in proportion to the types or number of digital devices they own (Goncalves et al., 2018). For instance, the rapid increase in the number of smartphones and tablets has offered users easy online access to the Internet, regardless of location. Similarly, Ballano et al. (2014) indicated that emergence of social media such as Instagram, Twitter and Facebook, have contributed to the digital nature of both old and young generations. The authors added that young individuals are often found online. Young individuals who are in universities use social media mainly for leisure and social purposes. Whereas, adults who are tech-savvy are likely to use social media for activities relating to their job or professional environment (Ballano et al., 2014).

Olawande Oni (2013) also reported that telecommunication providers lack interest in investing in broadening their network particularly in rural areas, due to low demand of their services. This supports West (2015) study which shows that individuals in rural areas tend to encounter poor Internet and other technological services. Furthermore, Olawande Oni (2013) added that technological innovation companies often avoid investing in areas that do not promise profits. For instance, a study by Naidoo (2011) showed that in underdeveloped places in South Africa such as Maphephetheni and Maphumulo, there are no basic technological infrastructure that would trigger the interest of the residents towards the adoption of technologies.

2.8.3 Individual attributes

Attributes are characteristics that define an individual (Makrakis & Sawada, 1996; Enoch & Soker, 2006). ICT offers an individual, communities and nations advantages and disadvantages with the use of technology. The literature indicates a variety of individual characteristics that account for technological gap. Broadbent and Papadopoulos (2013); Olawande Oni (2013); Smith (2015) Cox et al. (2018) found that income, age, gender, race and family background are strongly associated with digital divide. The factors are further discussed as follows:

- **Income**

ICT will be neglected if individuals' income barely enables them to fulfill their primary needs (Santos et al., 2017). Smith (2015) posited income level is associated with digital divide. In support, West (2015); Pick and Sarkar (2015); Santos et al. (2017); Delello and McWhorter

(2017); Lavery et al. (2018b) in their studies indicated that, to buy a computer or tools to gain access to Internet requires money, and that individuals with low-income are less likely to afford such devices. Elirea Bornman (2016); Lavery et al. (2018b) claimed that the African continent is mostly affected by poverty. The author indicated that, due to low income, a reasonable number of African households cannot afford basic home technological devices which can help in combating the digital divide. Naidoo (2011) also identified family income and high cost of technology devices as a barrier to bridging digital gap. He went further to compare the cost of IT devices such as computers and mobile phones in South Africa and America. Their study showed that the cost of a personal computer in South Africa is high, in relation to what individuals earn on a monthly basis. The author concluded that acquiring basic technology is expensive and that majority of the population cannot afford such expenses.

There is a high rate of unemployment in South Africa (Naidoo, 2011; Elirea Bornman, 2016; Elirea Bornman, 2016; Cox et al., 2018; Lavery et al., 2018b). Hence, a great number of South African citizens are living in poverty, and in most cases, they cannot justify the need to acquire IT or modern technological devices (Worden, 2011; Nyahodza et al., 2017; Cox et al., 2018). On the other hand, in a report by the United States department of Commerce titled, "*A Nation Online"* Victory and Cooper (2002) which focused on how Americans are expanding with respect to the use of the Internet and computers, it was observed that there is rapid growth in computer and Internet usage regardless of income, age, races, gender or ethnicity. The report also showed a rapid adoption of technology by low-income families.

- **Age**

Age is considered as one of the crucial factors contributing to the digital divide (Cox et al., 2018; Lavery et al., 2018b; Cardullo et al., 2018). Individuals who are 50 years and above, are often found to be non-users of modern technologies (Naidoo, 2011). This is because they believe that the devices, they already own can perform the functions they require. Additionally, they believe that modern devices are sophisticated in nature. Similarly, a study by Pick and Sarkar (2015) showed that older individuals believe that the use of technology is destroying human interaction and the essence of society. This according to them can be found in current interaction situations in which some children prefer staying indoors playing computer games and PlayStations, whereas about two decades ago, children would be outside playing playground games such as hopscotch, hide and seek and marbles. Waycott et al. (2010);Wu et al. (2015) also indicated that older individuals who have come across digital technologies later in life are often challenged by technology. As a result, they demonstrate less affinity towards technology. Similarly, in universities, the elder generation of students who enter at post graduate levels without having used technological forms of learning prefer using traditional means of studying rather than using e-learning. However, individuals between the ages of 17 and 28 years often demonstrate more confidence and experience with respect to different types of technology (Pick & Sarkar, 2015). For instance, in a study conducted by Ballano et al. (2014), students were grouped into four age groups; ages 19 and younger (regular students), age 20 to 24 (adult students), age 25 to 29 (matured student) and ages above 30 years. The findings in the study showed that there is an increasing rate of the Internet usage among young individuals especially ages 19 to 30.

- **Gender**

Literature has shown that gender differences exist in technology adoption and usage (Ritzhaupt et al., 2013; Alam et al., 2015; Adhikari et al., 2016; Mumporeze, Prieler, & Informatics, 2017). According to Gray, Gainous, and Wagner (2017), gender issue can be related to lifestyle and cultural beliefs and it is one of the factors associated with digital divide. The authors claimed that traditional female roles in Africa, are to be at home doing house chores such as cleaning, cooking and taking care of children. Tasks such as education, provision of food, shelter and security are believed to be the male's responsibilities. Joiner, Stewart, and Beaney (2015) also highlighted that, it is customary for female students to pick subjects like Art and English language while males often prefer Physics, Mathematics and metal work. The study further indicated a high rating towards economics and needle work for female students, and for males, Computer and Physics. The idea gives a clear evidence that females have mostly been turning away from computers and other IT related disciplines and that women specializing in computer and other IT related field are declining in universities (Jones & Bridges, 2016). Similarly, Ritzhaupt et al. (2013) found that females are less likely to be attracted to the use of technology than males. This is because they perceived the use of technology as traditionally dominant activities for males. Another study by Dhindsa (2012) showed that females have less confidence in the use of technology and that they found it less enjoyable when compared to males. This notion shows that gender differences exist between male and females with the use of technology, and hence considered as one of the factors that influence the digital divide (Ritzhaupt et al., 2013; Joiner et al., 2015; Adhikari et al., 2016).

- **Family background and structure**

Studies have shown that family background reflects on individuals' knowledge of technology (Brandtzæg, Heim, & Karahasanović, 2011; Olawande Oni, 2013; Wu et al., 2015; Raja, 2016; Delello & McWhorter, 2017; Chetty et al., 2018). In a study conducted by Elirea Bornman (2016), it was observed that students from well-educated homes, whose parents are doctors, managers and professors, tend to demonstrate high level of computer knowledge. In support, West (2015) claimed that high socio-economic status homes often engage in e-commerce activities and manage their financial resources online, as a result of their technological skills, educational level and income. Individuals or students from such homes tend to demonstrate high level of digital skills due to daily exposure to IT in their various homes. On the other hand, students or individuals from homes whose parents live on blue-collar jobs, retired or unemployed often possess low digital knowledge, because their parents in most cases lack the resources to acquire basic domestic IT needs (Raja, 2016). In addition, such parents are likely to find it difficult to partake in the digital environment, and in few cases they cannot afford quality education that will equip their children with the technological skills they need for further education and to compete with their peers in the digital world (West, 2015).

- **Language**

In South Africa's context, another factor that creates digital divide is language (Adomi, 2008; Elirea Bornman, 2016; Cox et al., 2018). There are eleven official languages in South Africa. The majority of those languages are not supported by information technology platforms. A vast number of the Internet sites are programmed using programming languages which is basic English. While the majority of older South Africans speak native languages such as isiZulu and isiXhosa. As a result, individuals, especially uneducated tend to demonstrate low affinity towards technology.

- **Race**

Another factor affecting digital divide is race, especially when dissecting digital divide in the South African context. Over the years, race has been reported as one of the contributing factor of digital divide in South Africa, most especially in schools and organizations (Jackson et al., 2008; Elirea Bornman, 2016; Nyahodza et al., 2017). It is believed that the apartheid era left a huge gap between races economically, academically and socially. Worden (2011) observed that Blacks who formed the larger percentage of the population could hardly afford basic domestic technologies during the apartheid era while their White counterparts lived a comfortable life.

Race has been reported as a contributing factor of digital divide particularly in educational institutions. According to J. A. Van Dijk (2006); Elirea Bornman (2016); Cox et al. (2018), White students tend to perform better in IT-related tasks, as compared to other races. In the same vein, a study by T. D. Oyedemi (2012) conducted among students in ten South African universities showed that White students had more access to computer and the Internet at home than students of other races. T. D. Oyedemi (2012) perceived that home access gives students the opportunity to utilize digital resources to a greater extent. T. D. Oyedemi (2012) and Nyahodza et al. (2017)'s ideas support Naidoo (2011)'s study which showed that the majority of Black students at one of the Universities in South Africa indicated that they often struggle with technological tools such as keyboard and mouse.

2.8.4 Government priority

Another barrier towards bridging the digital divide gap in South Africa is government priorities and family priorities (Subedar et al., 2018). The South African government is often seen as not doing enough to ensure equal access to information technology for the citizens. Regardless of race, tribe, location and family status (Mutula, 2005; Elirea Bornman, 2016; Cox et al., 2018). This is because the government focuses on a great number of challenges which in most cases, are often considered to be of more significant value than investing in IT infrastructure to enable equal access to IT for the citizens (Elirea Bornman, 2016). Some of the challenges that the government focuses on include controlling the AIDS epidemic, which remains a core priority for the government rather than ensuring IT access for South Africans (Subedar et al., 2018). In addition, in a family where children's health, feeding and basic education are top priorities, investing in technological acquisitions may not be seen as important (Elirea Bornman, 2016; Peroni & Bartolo, 2018).

2.8.5 Psychological factor

In a study by Pick and Sarkar (2015), it was shown that there are individuals who have aversion towards technology and may decide not to use technology. This often occurs due to the individual's lack of motivation to capitalize on technology as a resource (Lavery et al., 2018b). Similarly, Nyahodza et al. (2017) added that "lack of interest" is one of the reasons why individuals do not use technology. Furthermore, the motivation to utilize technology is different from having technological skills, confidence in one's technological devices and affordability. Robinson et al. (2015) added that an individual may own a personal computer and have unlimited access to the Internet, yet never utilizes it due to lack of interest, whereas, some individuals will travel long distances for the purpose of using a computer and the Internet. As indicated by Rooksby et al. (2002); Riggins and Dewan (2005); Smith (2015); Robinson et al. (2015), technological awareness should be introduced in schools to enlighten and motivate young individuals about the use and benefits of technologies.

2.8.6 ICT skills

Mere provisions and access to new technology without technological skills is not sufficient to bridge digital gap (Ritzhaupt et al., 2013; Ballano et al., 2014; Lussier-Desrochers et al., 2017). In developed and developing countries, the digital divide gap is found to be reducing in terms of physical access to technology. This is because provisions for technological infrastructure for citizens, which facilitates equal participation in the information society, are increasingly being provided. However, the digital divide still exists in terms of usage skills. The literature has shown that technology has become an integral part of daily classroom activities in academic institutions (Blake, 2015; Liebenberg, Benade, & Ellis, 2018). There are also provisions for technological infrastructure to aid students' learning process, for administrative purposes and to enhance teacher's duties during class sessions. However, the divide still persists in terms of digital skills and use of applications, globally (Ritzhaupt et al., 2013; Elirea Bornman, 2016). In Africa, there are opportunities for individuals to benefit from the advantages enabled by the use of technology, but only few individual have the skills to reap the benefits offered by the use of technology (Chikati, 2013).

In South Africa, lack of digital skills has also been reported in academic institutions (Waycott et al., 2010; Castaño-Muñoz, 2010; Naidoo, 2011; Robinson et al., 2015; Nyahodza et al., 2017). Naidoo (2011) stated that in South African institutions, there are students who have never been exposed to technology enhanced learning such as Learning Management Systems (LMS). The lack of technology exposure occurs prior to joining the universities. This poses a challenge for such students since most learning activities in universities require basic technology skills. Whereas, those students that have used technology from a young age are most likely to possess advanced technological skills. This is due to their early exposure to technology which in turn leads to an advantage over the students with no technology backgrounds. However, students' accessibility to digital resources as well as the required skills does not guarantee better academic performance (Meenakshi, 2013). This is because, according to Meenakshi (2013); Smith (2015); Siddiq, Scherer, and Tondeur (2016) , most students who possess technological skills often utilize technological resources for personal and leisure purposes and not for academic purposes. Nonetheless, they are at an advantage over those without digital skills

2.8.7 Geographical region

Geographic location has been reported as one of the factors that accounts for digital gap globally. According to Pick and Sarkar (2015), rich regions have high penetration rates, in terms of access and use of the Internet and computers. According to the world Internet usage statistics of 2017 (www.internetworldstats.com/stats.html), about 454 million people in Africa used the Internet daily. This accounts for 35% of the total population and 16.9% of the world's Internet population. About 2 billion Internet users were reported for Asia which signifies 48.1% of the total population, and 55% of the world's Internet population. About 705 million users were reported for Europe resulting in 85.3% of the total population and 10.8% of the world total population. South America reported about 438 million Internet users which accounts for 67% of the total population and 8.5% of the world's Internet population. Robinson et al. (2015) and Silva, Badasyan, and Busby (2018) are of the opinion that the African continent makes up only 3% of the world total population of Internet users.

It has been reported that the majority of South Africans live in under-developed areas that lack technological infrastructure (Jackson et al., 2008; Naidoo, 2011; Nyahodza et al., 2017; Lavery et al., 2018b). In such areas, the residents have no facilities that connect them to the digital world. The main source of connection to any form of technology begins with electricity. The under-developed places suffer from inadequate provision of electricity. Some of the areas still face the challenge of no electricity cables which means that computers would not be able to operate since plugging the computer to a source of electricity is required. Individuals in the under-developed places often live miles away from each other which consequently eliminates the possibility of implementing technological civilization (Sparks, 2013). This issue is perceived to be a loophole to digital development because the individuals staying in such areas often have no knowledge of how to use computers or even technological gadgets. Similarly, students from such areas are found in universities and they are likely to be at a disadvantage.

2.8.8 Urbanization

As indicated by Berrío-Zapata (2014), urbanization is a factor that is associated with other sociological factors that are responsible for digital divide. Urbanization often occurs among young individuals living in rural areas. Urbanization is a population shift which arises from the migration of individuals from rural areas to urban areas (J. A. Van Dijk, 2006). It is believed that both urban and rural areas have their distinct cultures and concerns which reflects in their priorities and needs. In addition, a term like “modern” is one of the characteristics associated with urban areas, while “traditional” is often used with the rural areas (Pauchard, Aguayo, Peña, & Urrutia, 2006; Hong & Thakuriah, 2018). Furthermore, urban areas are perceived as the embodiment of development, especially by young individuals living in the rural areas. Students and young individuals often move to urban areas because of the lack of basic infrastructure and the desire to escape poverty. Individuals who grew up in urban areas or move to urban areas are likely to have higher exposure to technology than those in rural areas. Therefore, individual who grew up in urban areas are at a better advantage over their rural counterparts (Hong & Thakuriah, 2018).

2.9 Technology Integration into Academic Institutions

The integration of technology in education to enhance teaching and learning has been in existence since the late 1960’s (Sun & Metros, 2011; Ramorola, 2013; Hamiti et al., 2014; Dočekal & Tulinská, 2015), and the literature shows that it originated in America in the mid-1960s (Fletcher, 2003; Sun & Metros, 2011). In 1970, the International Business Machine developed computer programs that enable computer technology to be used for pedagogical purposes. Also, the programmed logic for automated teaching operation (PLATO) designed in 1974 at the University of Illinois to assist teachers in the delivery of course materials to students was found to enhance the teaching and learning activities at the University (Fletcher, 2003; Sun & Metros, 2011).

Technology integration into educational systems has become important. This is because the evolution in technology has brought about a new dimension to teaching and learning. A number of definitions have been given to technological integration into educational institutions by different authors. However, all definitions revolve around the use of technological tools for pedagogical purposes in educational institutions. Zheng, Hatakka, Sahay, and Andersson (2018) indicated that technological integration entails the use of communication tools such as computers, the Internet, interactive media, satellite and other related technological methods to create, support and enhanced teaching and learning. Mahmood et al. (2018) added that integration of technology involves the synergy of technological hardware and software to boost teaching and learning. In the same vein, Cook and Polgar (2014); Blake (2015) claimed that the integration of technology consists of the implementation of technological resources and practice into pedagogical activities.

Studies by Ramorola (2013); Meenakshi (2013); Bernard et al. (2018) have shown the motives behind the integration of technology in educational institutions. According to Ramorola (2013), the use of technology for teaching and learning activities in classrooms enriches students with basic computer skills through the use of business tools such as spreadsheets, database and word-processing applications. As a result, students are able to create and manipulate data, thus, meeting one of the requirements to stand a chance of getting employed. Additionally, it offers them the skills required for participation in digital world. Studies by Garrison (2011); Mikre (2011); Meyers et al. (2013); Siddiq et al. (2016) showed that some academic institutions are often resistant when it comes to changing their learning approach due to lack of infrastructures and awareness. For instance, the assessment systems currently used to assess student performance in some universities are still based on traditional methods as against the more modern computer-based assessments (CBA). Technology-enhanced environments provide a better platform for learning as compared to the traditional learning environments. They are also a more effective way of teaching, learning and assessment, and as a result, have formed part of the motives that compel the need to integrate technology into educational Institutions.

One of the reasons why the integration of technology into education is important is because of its support for interactive instruction. It allows for bi-directional pedagogical activities (Fletcher, 2003; Meenakshi, 2013; Ramorola, 2013; Berrío-Zapata, 2014). For instance, e-learning allows students' full participation in classrooms, and also allows for teachers to deliver modules materials to students. Teaching and learning can, as a result, be carried out for both teachers and students, regardless of location, in a collaborative and interactive manner. According to Dočekal and Tulinská (2015), one of the primary functions of technology integration in educational institutions is its capability for interactive learning. Interactive learning entails teaching and learning activities using technology. It is based on discussion, sharing and delivery of module materials, communications and multimedia. As indicated by Garrison (2011), if individuals could get the best out of the available instructional technologies, everyone would learn efficiently, and as a result, everyone would become lifelong learners.

The benefit associated with technology integration into academic teaching and learning has triggered the interest of many developed countries such as Canada, South America, North America and Australia in adopting technology for pedagogical purposes. This trend has increasingly been realized in all educational institutions across the world from primary schools to universities, although it is more expressed at university level (Hamiti et al., 2014). African countries have imitated developed countries, hence technology is increasingly becoming an essential part of the educational system (Ramorola, 2013; Bernard et al., 2018). Naidoo (2011) highlighted that the South African Government continuously providing basic technological infrastructures such as computers and the Internet in academic institutions for administrative and pedagogical purposes.

For students, technology offers accessibility to module materials and also makes it possible for them to find informative materials to support their learning. Teachers also employ technology to implement new pedagogical strategies. This possibility has triggered the paradigm shift from learning how to use technology to learning how to integrate and utilize technology for both teaching and learning (Naidoo, 2011; Ramorola, 2013; Hamiti et al., 2014; Bernard et al., 2018).

2.10 Educational Technology and Academic Performance

A number of authors have argued about the implementation of technological enhanced environment for teaching and learning. Fletcher (2003); Summerville and Reid-Griffin (2008); Ramorola (2013); Bernard et al. (2018); Mahmood et al. (2018) highlighted the importance of technology in the classroom, they explained that the use of technology in the classroom reduces lecture time since teachers can upload modules materials online. In support, Pugh, Liu, and Wang (2018) claimed that, in the absence of technology in classrooms, it takes much time to teach and coordinate students. This often occurs in cases where there is one lecturer for many students, especially in first year classes. Furthermore, Dočekal and Tulinská (2015) indicated that technology can simulate one-on-one teaching for students who are lagging in difficult modules. For instance, students can further use additional materials that lecturers post on their learning sites such as Moodle to gain better understanding.

Hamiti et al. (2014) observed that, technology enables teachers to adapt to various students need. Considering that students often come from diverse academic backgrounds, they tend to have different learning styles and approaches. Sun and Metros (2011) added that technology can boost students' performance in subjects like Mathematics and Physics. In their study, which was carried out at Massachusetts Institute of Technology, they incorporated Mathematics into web-based programs, and they found that students' performance was improved in Mathematics. They also, in the study, stated that technology boosts student performances in science subjects.

Additionally, it was identified in the study of Kirschner and Karpinski (2010) that students enjoyed software-based and online learning programs. In higher educational institutions, technology therefore becomes a medium of learning whereby students are able to carry out a number of learning tasks effectively. For instance, most LMSs adopted by universities allows lecturers to reach out to students, put materials online and students are also able to communicate and share their views through the same system.

Ramorola (2013) also support the notion that technology is crucial for better academic performance. His study showed that technology provides students with unlimited information. For instance, the Internet allows students to download resources that could aid their learning. In addition, the authors emphasized that technology motivates students towards learning, as it allows self-directed learning (SDL), a learning process in which individuals take the core responsibility for learning activities such as planning, implementing ideas, and evaluation of their efforts, without assistance of their educators (Z. W. Goldman & M. M. J. C. E. Martin, 2016). Through self-directed learning, students develop confidence in individual learning and are empowered with taking decisions relating to their study. Similarly, Dornisch (2013) showed that students enjoy using technology especially to search for information and also, to carry out learning tasks. The author added that, the use of technology prepares students for the future by offering them the digital skills they need for graduate employment and also to be a partaker in the current digital world. Furthermore, Jones and Bridges (2016) indicated that the use of computer-based writing tool has been found to enhance students' writing skills. According to their study, over 78% of student perceived that use of computer-based writing tools such as Grammarly and Hemingway editor assist them in their writing and improve their writing skills.

On the other hand, Checchi et al. (2018) claimed that educational technologies such as computer and the Internet are not "magic tools" to boost students' academic performance. The authors claimed that to ensure better academic performance of students, it is essential to investigate the use of the technologies being integrated into educational systems. Adding that, the long hours spent on leisure or personal activites instead of academic activities, when students are using technology, impacts on students' academic performances. In support, Au-Yong-Oliveira, Gonçalves, Martins, and Branco (2018) added that students tend to engage themselves with technologies for leisure purposes such as chatting and visiting online social networks. The authors stated that, in some cases they spend periods meant for learning activities on social networks while using technology, and this in turn influences their academic performance. However, according to the authors, students can make use of available technology for leisure and personal purposes but in a way that it does not impact on their academic tasks.

In a survey conducted by Mashile (2016), students were asked about the task(s) they mostly perform on the their technological devices, about 60% of the students indicated "engaging in leisure activities" particularly on social networks and financial investment websites (e.g. Forex). The study showed that students who are addicted to leisure activities often use excessive amount of time on the Internet. This often causes psychological distress such as anxiety, sleeplessness, social seclusion and depression which in-turn negatively affects their academic ahievement (Chen & Peng, 2008; Dočekal & Tulinská, 2015). Mashile (2016) concluded that the use of the Internet and computers in academic institutions may improve academic performance if its usage is properly managed.

Pallas, Eidenfalk, and Engel (2019) also found that most students use computers and the Internet not only for academic purposes but for entertainment. Their study showed that the amount of time students devotes to academic work while using computer and the Internet varies. According to Ng'ambi, Brown, Bozalek, Gachago, and Wood (2016), the total amount of time an individual devote to the use of technology is the function of the individual's motives towards the use of such technology. Observations from the study by Pugh et al. (2018) showed that, while using computer and the Internet some students devote less than 10% of their total time on academic work while over 90% of their total time is devoted to personal tasks, leisure and entertainment. Furthermore, a study by Choden (2013), reported 19 hours for total amount of time students devote to computer and Internet use per week. In the study by Giunchiglia, Zeni, Gobbi, Bignotti, and Bison (2018), which focused on how university students use their time online and its implication on their performances. The study was conducted on 14 university students, and its findings shows that students often engaged with computer and the Internet for about 19 hours on weekly basis. The study further showed that for these students, only about 5 hours is spent on academic-related work per week.

Considering the different views of the authors, it can be inferred that technology integration does not guarantee better academic performance especially if excessive hours meant for studies are being spent on non-academic online activities. However, if technology is utilized appropriately it will enhance teaching and learning efficiency and better academic performance will be achieved (Copeland, Birmingham, DeMeulle, D'Emidio-Caston, & Natal, 1994).

2.11 Digital Literacy

Over the years, advancement in technology and its pervasive use has brought about reformation in all aspects of human life. The way we live, how business activities are being carried out and how knowledge is being shared are now being transformed. In the light of technological advancement, technological skills are crucial for individuals to accomplish educative, managerial and administrative tasks and to be a partaker of the digital society (McGuinness & Fulton, 2019). Individuals' lack of technological skills is akin to being handicapped in the digital world, because of the inability to use technological resources. The lack of technological skills is considered as a global problem because it exists in most countries, across the academic, individual, and organization levels (Schneider et al., 2018).

Digital literacy was considered as a need around 1960 due to the emergence of computers, the Internet and evolution of ICT (Connolly & McGuinness, 2018). Various authors have provided different definitions for digital literacy however, all the definitions revolve around human cognitive thinking and ability to use digital technological tools for media expression, accessing information, creating information and for communication. Digital literacy was publicized by Paul Gilster in the late 1950s (Knobel, 2008). According to Gilster and Glister (1997), Martin (2008), and Breakstone, McGrew, Smith, Ortega, and Wineburg (2018), digital literacy entails individuals' awareness, attitude, cognitive thinking and ability to appropriately utilize digital tools and infrastructures. It also entails locating, accessing, analyzing and integrating digital resources to form new insights in a specific context. Gilster and Glister (1997) highlighted human cognitive thinking as the core skill of digital literacy rather than technical competence. Furthermore, they added that critical evaluation of what is displayed on digital tools is of more significant value than the technical skills required to access it. As literacy exceeds mere ability to read and write but with meaning and understanding, likewise, digital literacy goes beyond technical skills but together with the cognition of what an individual sees on the digital tools.

Connolly and McGuinness (2018) in their study, highlighted individuals' cognitive function as a critical element of digital literacy. Their study also supports Gilster and Glister (1997)'s study which showed that digital literacy goes beyond digital skills but includes the critical evaluation of what is found on digital tools through an individual's evaluation. Buckingham (2015) on the other hand, defined digital literacy as a set of habitual behavior through which individuals utilize digital technology for a number of tasks such as personal and learning tasks. However, he highlighted contemporary education as an essential element of digital literacy.

Osterman (2013) defined digital literacy as the ability to use technological tools effectively to create, locate and use information. According to the author, the knowledge of using information presented on digital devices in various format from different source is crucial. In addition, Johnston (2017) made emphasis on graphical interface of some digital tools such as computers, tablets and smartphones, which depicts information and directives which are often accompanied with symbols and images. This is because information and directives provided by the digital tools need to be analyzed and deciphered through eyesight. Therefore, to be digitally literate, one must be visually literate in terms of being able to see information and directives displayed on the digital tools

Contrary to Gilster and Glister (1997)'s approach towards digital literacy, Leu et al. (2011) highlighted three tenets towards digital literacy. The tenets are states as follows:

- Digital literacy is the core requirement for participation in the modern society.
- Literacy is susceptible to change as technologies constantly evolve.
- Literacy entails individual's competence with respect to skills, strategies, and principles needed by digital technologies for various task such as learning and communication.

The authors concluded that being digital literate is not as important as having the skills to adapt to the various technological innovations, since technology is constantly evolving.

2.12 Towards Bridging Digital Divide

The Literature shows that bridging digital divide has been made a top priority by the government of some African countries, especially in countries where technology adoption is at a slower pace (Fuchs & Horak, 2008; Elirea Bornman, 2016; Cox et al., 2018; Lavery et al., 2018b). In South Africa for instance, there are provisions for technological infrastructure such as computers and the Internet in schools to improve technological skills and enhance students' learning process. In an attempt to bridge the wide technological gap and ensure equal benefits of digital age for individuals, there is recognition for certain roles for individuals, organization, institutions and governments.

Elirea Bornman (2016) have identified lack of technological infrastructure as a major factor that influence digital divide in developing countries. This is a major issue that needs government intervention. This is because government is seen as an enforcer of national development and they possess significant power to fuel the deployment of new information and technologies in various sectors of the society. Lavery et al. (2018a) added that the government should introduce policies that will promote technological innovation. For instance, a study by Brandtzæg et al. (2011) showed that in an effort towards bridging the wide technological gap in India and transforming the country into a knowledge society, the Indian government initiated several measures, such as the introduction of a policy that supports the future integration of IT in the society. This is because IT offers new opportunities which boosts the economic status of all sectors of society such as academics, organization and health. Furthermore, the government can also commission some IT schemes such as IT action plan and IT task force.

Apart from the provisions for technological infrastructure, Schneider et al. (2018) remarked that government should offer incentives to encourage IT companies to invest in underdeveloped regions of the country. Incentives can be done in different ways such as reduction in land prices and reduction in registration charges and tariffs exemptions. In addition, partnership between private IT sector and government may be launched with the intent of establishing ICT parks. An example of this can be seen in the case of the Indian government partnering with TATA group and Singapore consortium to commission the International Technology pack in Bangalore, India. Furthermore, the government may also subsidize Internet connectivity. This will, as a result, boost individuals' interest towards IT.

Elirea Bornman (2016) observed that the pervasiveness of smartphones fueled by its affordability holds the promise of bridging the digital gap. This is because smartphones offer individuals a new window of opportunities as it provides users with Internet functionalities option. Similarly, a study conducted by Bridge, a Cape Town-based international research institute, investigated ICT access and IT needs of South African citizens. The findings in the study shows that majority of the individuals in South Africa have access to mobile phones. The finding also revealed that a significant number of individuals do not have access to the Internet via personal computers but smartphones. Therefore, if individuals have access to smartphones with Internet functionality, the use of smartphones may help in promoting ICT and as well as bridging the wide digital gap.

Botha, Van Greunen, and Herselman (2010); Johnston (2017) in their study, indicated that wireless device such as smartphones can be used as substitutes to personal computers and landlines as means of accessing the Internet. The authors added that wireless technology could help to bridge the digital gap for individuals who do not have access to a computer. This is because access to the Internet via wireless technologies on smartphones is increasingly available to the masses. In South Africa, for example, one of the cellular service providers, provides free Internet access to subscribers during off-peak periods. This is an initiative which can help to bridge the digital gap since it encourages individuals to use their mobile phones to browse the Internet for free at certain times. Furthermore, the continuous deployment of new 4G smartphones such as Samsung, Sony, Hisense and iPhone allow users to browse the Internet with ease using wireless technology (www.cellular.co.za/stats-main.htm)(Cox et al., 2018).

In an attempt towards bridging the digital gap, Elirea Bornman (2016) highlighted disparities in scientific outputs which addresses the issue of digital divide between developed, and underdeveloped nations globally. The author claimed that scholars of underdeveloped nations have not yet made a significant contribution to the scientific world. For instance, in Malawi, the total percentage of research output which addresses digital divide in the country was only about 0.7% as at 2010 while India and China contributed 1.9% and 2% respectively (Pick & Sarkar, 2015; Elirea Bornman, 2016). This result reflects low scientific activities in the Malawi. Similarly, Mohammed (2013) indicated that African scholars need to make significant contributions which addresses the issue of digital divide, to international scientific publications. This in turn will offer them more insight on bridging the digital divide.

2.13 Conclusion

The review of literature show that digital divide in South African context has been in existence since the apartheid era, due to unequal distribution of basic technological infrastructures which existed among the ethnic groups. Similarly, it was observed that the integration of ICT into educational systems has change the teaching and learning approach and consequently creating challenges for students who lack basic technological skills. The major digital divide challenges related to student are with the use of computer for learning task, input peripherals and e-learning platforms such as Moodles. In addition, the impact of these challenges is seen in student’s academic outcomes, self-esteem and chances of employment. Furthermore, factors such as family background, income, geographical location are some of the influencing factors of the digital divide. The next chapter presents the methodology implemented for this study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter presented the review of literature on the digital divide. The chapter also identified the digital divide challenges and its consequences on students learning and performance within educational systems. Furthermore, it discussed how technology has changed the teaching and learning approach which in turn brought about a gap among students who have technological skills (due to prior exposure to technology) and those who do not have. This chapter presents the research methodology adopted in this study. According to Sekaran and Bougie (2013); Ary et al. (2018), research methodology is an integral part of a research study and any judgement relating to the quality of the study is contingent on the clarity and relevance of the methodology employed.

3.2 Research Design

The research design defines the researcher's general plans that will provide answers to the research questions that underpins the research study. According to Bhattacherjee (2012), research design defines the plan for data collection, the unit of analysis, structure of survey used for data collection, and the type of results the study is aimed at obtaining. In order to obtain different views about the phenomenon (digital divide) being studied and to achieve the objectives of the study, the following approach and steps were implemented:

1. Method of research: Quantitative research methodology
2. Planning for sampling
3. Data collection
    a. Designing of questionnaire
    b. Questionnaire distribution
    c. Data capturing
    d. Data processing and analysis
    e. Interpretation and reporting

According to Bhattacherjee (2012), research design can either be exploratory, explanatory or descriptive in nature. Exploratory research design is conducted when nothing is known about the study of interest. It is often carried out to create a preliminary idea about a phenomenon of interest. Explanatory research design explains the phenomenon of interest, and provides answers to "what", "where" and "when" questions that underpin the study of interest. This type of research design is suitable when investigating causes, effect, and outcome. Descriptive study design is employed to provide detailed description of a phenomenon. It ascertains and describes the characteristics of different variables in the study. Additionally, it focuses on describing the important aspect of the variable of interest in real life situation. A descriptive study design was implemented in this study. As the researcher has no control over the different variables that underpin the study, the descriptive research design enabled the researcher to gain clear insight on the factors associated with digital divide. In addition, the descriptive research design guided the researcher in the provision of explanations that would help in devising solutions to managing the challenges of the digital divide.

3.3 Research approaches

Research methods are divided into quantitative and qualitative methods. According to Bhattacherjee (2012), quantitative method explains a phenomenon through numerical analysis of data collected through data collection instruments such as questionnaires, polls and survey. Essentially, quantitative method focuses on collecting numerical data to explain a phenomenon. While a qualitative method involves the use of qualitative data, which is collected through different methods such as interviews, observations, to understand and explain social phenomena. A combination of qualitative and quantitative research approach can also be employed to solve an identified research problem in a process called mixed methodology. For this study, the researcher adopted a quantitative method of research. This method, according to Ingham-Broomfield (2014), is a technique relevant for testing a proposed theory through examining the relationships existing between the variables (independent and dependent) of the study. This method was adopted because it allows the researcher to quantify the defined variables, which can help in the generalizability of the results of the study. In this study, a questionnaire (as a quantitative data collection instrument) was used to collect data.

3.4 Research Aims and Objectives

According to Kumar (2019), a well-defined set of objectives help in the selection of the most appropriate method for the management of a research study. The objectives of this study are presented below:

1. To understand the factors that affect student's computer self-efficacy (or lack-off), prior to joining the university
2. To identify the challenges faced by first year students in the use of technology for learning

3.5 Sample design

According to Taylor, Bogdan, and DeVault (2015), sampling process involves three (3) steps;

1. **Defining the population**: This entails the group or objects of interest a researcher wishes to identify their characteristics or parameters and make conclusions about.
2. **Sampling frame**: This provides the researcher with population where a sample can be drawn.
3. **Sample selection:** This is the actual selection of the sample from the sampling frame based on the sampling technique employed.

3.6 Study site

This study was conducted at the Pietermaritzburg campus of University of KwaZulu-Natal. The campus is located in Pietermaritzburg, which is one of the cities in the province of KwaZulu-Natal (KZN), and which is part of the Msunduzi Municipality. Pietermaritzburg is the capital of Kwazulu-Natal province and is the second largest city in the province, with the total population of 223,448 (Census 2011). The researcher chose the location (UKZN PMB campus) due to ease of access to data collection.

3.7 Target population

Taylor et al. (2015) indicated that the population of a study is the group of objects or people of the same characteristics that a researcher wishes to study, so as to gain a clear insight of the phenomena under study. In this study, the target population were the first-year students of UKZN Pietermaritzburg campus, the population contained 9741 students. The reason for selecting first year students is based on their new level of exposure to technology-enhanced learning provided at the university.

3.8 Sample size

Farhady (2013) defines sample size as the complete group of elements under consideration for a study. According to Krejcie and Morgan’s (1970), the sample size from the target population plays a crucial role in the research study as it determines the generalizability of the research findings. The authors claimed that a small sample size limits research finding to a subgroup within the target population. According to Krejcie and Morgan’s (1970) table, the required sample size for population between the range of 9000 and 10000 is 370. Therefore, from the target population of 9741 students, a sample size of 370 was chosen for this study.

3.9 Sampling Techniques

Sampling is the process or act of selecting a sample from a target population with the intent of identifying the characteristics or parameters of the whole population (Farhady, 2013). According to Bhattacherjee (2012) and Farhady (2013), sampling techniques in a research study can be grouped into two categories; Probability and non-probability sampling techniques. Probability sampling is a sampling technique whereby each unit in the target population has a chance of being selected. Non-probability sampling is the technique whereby each unit is selected in such a way that the chance of selection of each unit in the population is unknown (Taylor et al., 2015).

Flick (2015) identified four types of probability sampling method which are:

i. **Simple random sampling:** This is a sampling method that offers each unit in a target population an equal chance of selection. According to Flick (2015), simple random sampling is applicable when the population is small.

ii. **Stratified sampling technique:** This is a method of sampling in which the sample frame is divided into different groups such that each unit that shares the same characteristics are put together in groups. Thereafter, simple random sampling is carried out on each group to form a sub-sample from each strata (Bhattacherjee, 2012).

iii. **Cluster sampling:** This is a sampling process employed where the target population is being spread over a wide area. In the sampling technique, the population is divided into sub-groups called clusters, thereafter a simple random sampling is performed on the clusters (Sekaran & Bougie, 2013).

iv. **Systematic sampling:** This is a sampling method that entails the selection of a unit according to a predefined criterion (Kumar & Phrommathed, 2005).

Non-probability sampling on the other hand, can be employed in a case where there is a limited amount of time (Farhady, 2013). This sampling technique, although, according to Bhattacherjee (2012), may be subjected to sampling bias because selection of units in the target population is not random. Mackey and Gass (2015) identified three different types of non-probability sampling techniques which are:

i. **Quota sampling**: In this method of sampling, the researcher identifies a specific characteristic in the respondents, thereafter, a customized sample that is in proportion to the population of interest is selected. Quota sampling is suitable for a study that aims to investigate characteristics of a subgroup. One of the advantages of this sampling techniques is that, it allows for population proportion. However, the major drawback of quota sampling is selection bias (Mackey & Gass, 2015).

ii. **Convenience sampling**: This sampling process (also called opportunity sampling) allows the researcher to pick a sample from the population, based on convenience or availability (Kothari, 2004). This sampling techniques is mostly used in business studies. For instance, the sampling techniques may be adopted to obtain data from customers with regards to new product and services.

iii. **Expert sampling:** This technique involves the selection of respondents according to their experience on the phenomenon being investigated. This technique is used when a researcher requires opinions of individuals with a high level of skills in a specific field of interest.

This study employed the probability sampling because it helps in eliminating sampling bias by giving every student in the target population an equal chance of being selected (Farhady, 2013). More specifically, a cluster probability sampling technique was adopted for the study. Each of the three colleges in UKZN-PMB campus formed a cluster. Cluster 1 was the College of Law and Management Studies, cluster 2 was represented by the College of Humanities and cluster 3 was the College of Agric Engineering & Science. Thereafter, a sample was drawn from each cluster by using the simple random sampling method. The combination of all the drawn samples (370 in total) constituted the final sample for the study.

3.10 Data collection Techniques

Farhady (2013) identified three commonly used data collection methods in a research study. The methods are:

i. **Observation method**: In this data collection method, information can be gathered through the researcher's own direct observation. In addition, at any point in time, the observation recorded may be subjected to checks on reliability. This method is free of subjective bias, provided the observation is done correctly. The method is suitable for a study in which the respondents cannot provide verbal communication of their feelings or perceptions (Neuman, 2013).

ii. **Interview method**: According to Bhattacherjee (2012, p. 78) "survey interviews are more personalized form of data collection method than questionnaires, and are conducted by interviewers, using the same research protocol as questionnaire surveys (i.e., a standardized set of questions)". Mackey and Gass (2015) identified three types of Interview method namely face to face, focus group and telephone interviews. The face to face interviews requires the researcher (the interviewer) to ask questions one-on-one with the respondents. An interviewee may also ask questions from the interviewer, although the interviewer usually initiates the process and takes the information through recording or writing. In telephonic interview, the researcher contacts the potential respondents through the phone to ask a standard set of survey questions. The focus group interview on the other hand, allows the researcher to interview a small group of respondents in a location. In the technique, the researcher is the facilitator of the discussion and ensure that each of the respondents has opportunity to respond to the questions.

iii. **Questionnaire Method.** In this method, a questionnaire is given to the participants in the study. A questionnaire can also be emailed to the target respondents. Most researcher adopts this method because of the low cost involved, especially when the respondents are dispersed over a wide geographical area. Essentially, a questionnaire consists of set of questions printed in sequence order as a document. According to Neuman (2013), it is always recommended to carry out a pilot test on the questionnaires before administration takes place, this is because it provides valuable insight. In addition, it helps to identify potential error or problem in a data collection instrument (Bhattacherjee, 2012).

3.11 Questionnaire

In this study, questionnaire was employed as the instrument for data collection. According to Mackey and Gass (2015), a questionnaire is an integral part of a quantitative study, therefore, it must be carefully designed. In addition, Farhady (2013) stated that to ensure the effectiveness and quality of the questionnaire, the researcher must pay attention to the manner through which the questions are presented. Kumar and Phrommathed (2005) identified two different question types in questionnaire, and these are the structured and unstructured questions. Structured questions enable the respondents to pick their response from the available set of choices while unstructured questions offer the respondents the chance of providing a response in their own words.

According to Farhady (2013), a questionnaire can be self-administered, or group administered. A self-administered questionnaire allows the researcher to give the questionnaire to the respondents through email or by hand after which the respondent is expected to read and complete the questionnaire, then send back to the researcher, either by email or by hand. The group-administered questionnaire entails the researcher bringing together the respondents at the same place and time, and each of the respondent is asked to read and complete the questionnaire independently without interaction. In this study, self-administered questionnaires were given out by hand to the respondents. Before the questionnaires were given out, questionnaire pre-testing was carried out. This was done to assess the quality of the questions in the questionnaires. During the pre-testing, it was observed that some of the questions could put strain on the memory of the respondents. It was also found that the question sequence was not clear enough. These errors were corrected by constructing clear and understandable questions, also the sequence of the questions was made clear to reduce the chances of the questions being misconceived. In addition, there was possibility that some students were repeating first year modules as responses from such students will muddy the data. Therefore, prior to handling out the questionnaires, the researcher confirmed with the students on whether they were new university entrants.

3.11.1 Questionnaire Structure

The questionnaire for this study was divided into sections with the following headings:

A. **Background Information:** This section presents the study's respondents with questions relating to their age, gender, race and college.
B. **Technology Ownership:** This section presents the study's respondents with questions to probe whether they have owned any type of technology device(s) prior to joining the university.
C. **Technology accessibility:** The section investigates whether the study's respondent have had prior access to any form of technology prior to joining the university.
D. **Information about Technology skills:** The questions under this section helped the researcher to understand first-year students' level of competency with regards to the use of technology to support learning process.
E. **Information about academic performance:** This section was aimed at giving the researcher a clear insight on the impact of technology on performance, based on prior (or lack of) exposure to technology.
F. **Perceived usefulness:** The section investigates the extent to which first-year students perceive technology to be useful for learning purposes.
G. **Perceived ease of use:** The section investigates the extent to which first-year students believe technology is easy to use for learning purposes.
H. **Challenges in the use of technology for learning purpose:** The section focused on identifying the challenges that first-year students face while using technology.

3.12 Data Analysis

One of the purposes of data analysis is to apply statistical techniques to the collected data so as to organize, describe and interpret the data (Flick, 2015). According to Bhattacherjee (2012), descriptive and inferential analyses are two statistical techniques that can be very useful when working on numerical data obtained. In this study, both the descriptive and inferential analyses were employed. The descriptive analysis entails graphical and numerical procedure to summarize the collected data in a comprehensible manner. While the inferential analysis provides a technique to derive inferences from the data (Neuman, 2013). In this study, the collected data was captured by using 0s and 1s for the responses in Microsoft Excel and then exported into Statistical Package for Social Sciences (SPSS) for analysis.

3.13 Reliability and Validity

Neuman (2013) indicated that to ensure that the measurement tools measure what they are meant to measure (such as hypothesis and research questions), the measurement tool must meet the test of reliability and validity. Farhady (2013) defines reliability as the degree of consistency of the measured construct and Validity as the extent to which an instrument measures what it is intended to measure. Sekaran and Bougie (2013) claimed that an efficient method to determine data validity is to ask questions relating to the topic of interest and analyse the respondent's responses to draw a general conclusion. To ensure the validity of the research instrument in this study, the questionnaire was sent to experts within the university's research committee for scrutiny. The errors and modification identified by the committee were corrected before the data collection process took place.

3.13.1 Reliability

Sekaran and Bougie (2013) identified four types of reliability test;

- **Internal consistency reliability** measures the consistency existing between various items of the same construct.
- **Test-retest reliability** depicts the consistency between two measurements of the same survey distributed to the same sample size at different time.
- **Split half reliability** measures the consistency between two halves of a hypothesis measurement.
- **Inter-observer reliability** depicts consistency level between two neutral observers of the same construct.

In this study, the internal consistency reliability of the research instrument was assessed using the Cronbach Alpha coefficient test. Kothari (2004) indicated that a good research instrument must have a Cronbach Alpha of 0.70 and above. The reliability for this study has the value of 0.817. The table showing the reliability result is presented in the next chapter (chapter 4).

3.13.2 Validity

Bhattacherjee (2012)indicated three types of validity which are:

i. **Content validity:** Depicts the extent to which a measuring tools provides a true representation of the constructs measured.
ii. **Criterion related validity:** This focuses on an individual's ability to foretell the outcome of the present situation of a research study.

iii. **Construct validity:** The degree to which the result of a measurement correlate with the other constructs with different measuring tools. For instance, to access the construct validity, we compare other constructs with the result given by the measuring tool.

This study employed content validity, to assess the quality of the research instrument.

3.14 Theoretical Framework

This study employed two frameworks. The digital divide framework (Figure 3.1) which was created by Wei, Teo, Chan, and Tan (2011) and the Technology Acceptance Model (TAM) (Venkatesh & Davis, 2000). In the digital divide framework, the authors divided the model into three major parts which are digital access divide, digital capability divide and digital outcome divide.

The Digital divide framework seeks to explain factors pertaining to digital divide, such as access to ICT and skills to use ICT. Once an individual has gained access to technology, different social cognitive abilities are developed in line with the individual's context of use (i.e. learning, personal) and computer self-efficacy levels. This signifies digital capability divide among individuals. The gained knowledge and skills bring about further advantageous impact on the individual's outcomes with respect to their context of use, and in-turn leads to digital outcome divide (Wei et al., 2011). In the context of this study, the third construct was aligned with the students' academic performance based on the students' access to ICT and their capabilities

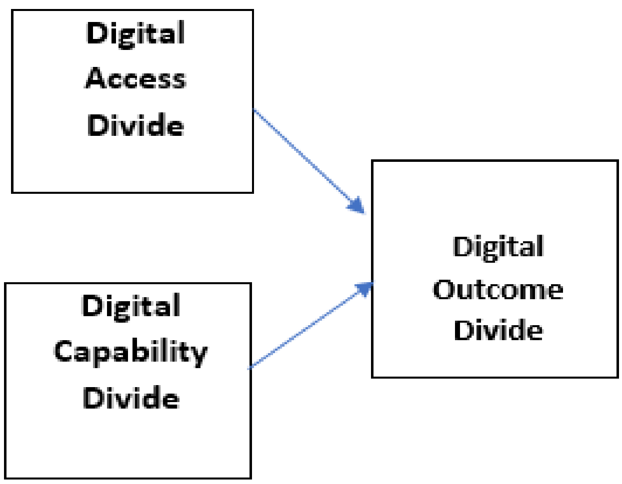

Figure 3.1: The digital divide framework (Wei et al., 2011)

The three constructs of the framework constituted the constructs through which the research questions in this study were developed. The constructs of the framework in relation to the study's questions are discussed below:

3.14.1 Digital Access Divide

Access to technology is the prerequisite to gaining digital benefits, and the requirements for technology use. Digital access divide focuses on disparities in physical access to digital technology which is mostly hardware and software (Wei et al., 2011). In the scope of this study, the first construct (digital access divide) was used to determine if students have had access to technology, and to know the type of technology, prior to joining the university. In relation to the research question, in the questionnaires, students were asked to indicate whether they have had access to or own technology devices prior to coming to the university. In addition, they were asked to indicate the technology they currently own or have access to.

3.14.2 Digital Capability Divide

Digital capability divide investigates individual technological skills and what individuals are able to do when they have access to digital technology. In this study, the construct was used to investigate student competency level with the use of digital resources to support learning. In relation to the research question, students were asked in the questionnaires to indicate their level of competency with the use of technology, especially with regards to learning purposes.

3.14.3 Digital Outcome Divide

In this study, digital outcome divide was used to investigate students' academic performance with respect to the use of technology as well as their competency level. In addition, the construct was also used to identify what challenges students mostly face in the course of using technology. In the questionnaire, students were asked to indicate the challenges they encounter while using technology for learning.

The second framework adopted in this study was the Technology Acceptance Model (TAM) (Venkatesh & Davis, 2000). This framework shows factors that determine why individuals accept or reject technology. The framework contains two main independent constructs; Perceived Usefulness and Perceived Ease of Use. In the scope of this study, the model was used to investigate the perception of students towards the use of technologies. In this study, the technologies tested against the TAM framework were namely computers, laptops, Internet, and smartphones. This is because these technologies are perceived as learning tools used by students for learning purposes.

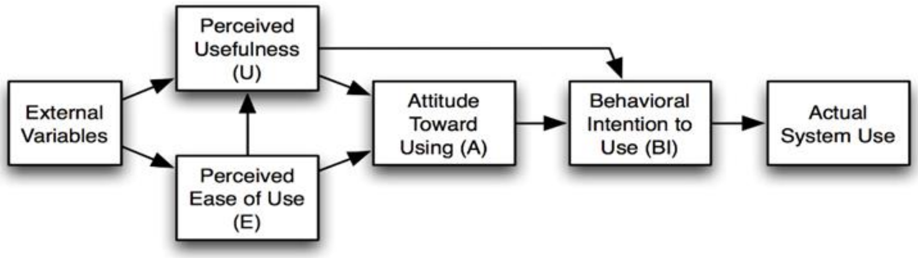

***Figure 3.2*: Technology Acceptance Model (Venkatesh & Davis, 2000)**

The Constructs of the model in relation to the study's questions are explained below:

3.14.4 Perceived usefulness

This is defined as the extent to which an individual believes that using a particular technology will improve their job performance (Venkatesh & Davis, 2000). In this study, the construct was used to investigate the extent to which students believe technologies such as computer, Internet are useful for learning purposes.

3.14.5 Perceived ease of use

This is defined as the extent to which an individual believes that using technology will be free of effort (Venkatesh & Davis, 2000). In this study, the construct was used to examine the extent to which a student believes he/she finds it easy to use available technological resources to carry out learning tasks.

3.15 Ethics

As one of the requirements of scientific research, the study followed all the scientific principles as well as the university's ethical principle. In this regard, ethical approval for this research was acquired from the UKZN ethics committee. Furthermore, to guarantee that integrity is upheld, the researcher gave out informed consent forms to the respondents which permitted the respondents to decide whether or not to partake in the study. Confidentiality was maintained by ensuring that the participants' responses and personal identifiable information is not disclosed to any third party.

3.16 Conclusion

This chapter presented the research methodology, sampling and data collection techniques that was used to achieve the objectives and to obtain the findings in the study. Descriptive approach was implemented, and data was obtained through questionnaires. A cluster probability sampling technique was used to select the sample required for the study. The next chapter presents the result of the data analysis.

CHAPTER 4: FINDINGS AND ANALYSIS

4.1 Introduction

The preceding chapter presented the research methodology that was used in this study. In the chapter, the data collection tool is presented as well as the sampling techniques employed. The chapter also explained the population and methods of analysis for the study. This chapter further provides the analysis of the collected data and also presents the various tests that were conducted on the data.

As explained in chapter one, this study focuses on identifying the challenges of digital divide among first year student as well as devising possible means through which the challenges can be alleviated. To achieve this objective, the following were the main research questions asked:

- What factors affect students' computer self-efficacy (or lack-off), prior to joining the university?
- What are the challenges faced by first year students in the use of technology for learning?

The interpretation of the analysis is, however, presented in chapter 5.

4.2 Response rate

The sample size for this study was selected in conformity with Krejcie and Morgan (1970)'s table. As at the time the study was conducted, the population of first year students in UKZN (PMB campus) was 9741. As indicated in the table, the required sample size for population between the range of 9000 and 10000 is 370, therefore, 370 questionnaires were given out to the first-year students of UKZN (PMB campus). The data collection process was over a span of two months. Out of the 370 distributed questionnaires, 364 were received and usable, resulting in a 98% response rate.

4.3 Consistency and Reliability

To determine the consistency level in the collected data, i.e. student's responses, the Cronbach alpha test was carried out. This test was considered imperative as it helps to determine whether the data are reliable and suitable enough to provide accurate results. Tavakol and Dennick (2011) posit that a reliability coefficient (Cronbach alpha), based on inter-item relationship determines the validity of a data collection tools. Hence, a Cronbach alpha value greater than 0.7 signifies high reliability in the research instrument. Similarly, Green et al. (2016) indicates that the closer the Cronbach alpha value to 1, the higher the reliability in the responses, and the greater the chance of acquiring high internal consistency. The reliability and consistency of the items used in this study were determined through a reliability test in SPSS, a Cronbach value of 0.817 was obtained in study, as shown in Table 4.1, meaning that the questions and the responses in the data collection tool were consistent and reliable.

Table 4.1: Reliability Statistics

Cronbach's Alpha	No. of Items
.817	48

4.4 Distribution of data: Normality

Kim (2013) posits that before statistical analysis can be performed on a data set, such data must be examined so as to determine whether it follows a normal distribution in a process called Normality test. In the distribution of data, normality, according to Middleton (1988); Sekaran and Bougie (2013), is when data findings cluster in the middle of the range which results in a bell-shaped, symmetrical, image. Although, most statistical analysis are carried out with normally distributed data (Evans & Murshudov, 2013), it is imperative to check the normality of a data set prior to statistical analysis. Various test, such as Kolmogorov Smirnov and the Shapiro-Wilkes test can be employed to assess the normality of a data set (Norušis, 2006). In the same vain, Laerd (2013) indicated that for a normally distributed data, a parametric test such as T-tests and ANOVA may be carried out on such data sets. While non-parametric tests such as Chi-square, and Friedman tests are applicable to data that do not follow a normal distribution. Additionally, for a data set to be considered normally distributed both Shapiro-Wilk and Kolmogorov tests must have a significant value greater than 0.5 (Kowalski, 1972). In the event that the significant values are less than 0.5, such data set is considered as non-normally distributed data. For this study, data was examined through Kolmogorov Smirnov and Shapiro-Wilk test to access its normality. The significant value obtained was less than 0.05, (Appendix D) which implies that the data used for this study was not normally distributed hence chi-square tests (non-parametric test) was carried out on the data sets.

4.5 Descriptive statistics

This section provides background information of the participants of this study. A total of 364 first year students of UKZN Pietermaritzburg campus correctly completed the questionnaire. The respondent's information according to their gender, age and race are presented as follows.

4.5.1 Gender

Respondents were asked to indicate their gender. As shown in Fig 4.1, 61.1% of the respondents were female while 38.9% were male. Meaning that there are more female students that participated in this study than male. The gender result of the participants for this study relates to the study of Koss (2018) which demonstrates the prevalence of female students over males in public higher institutions.

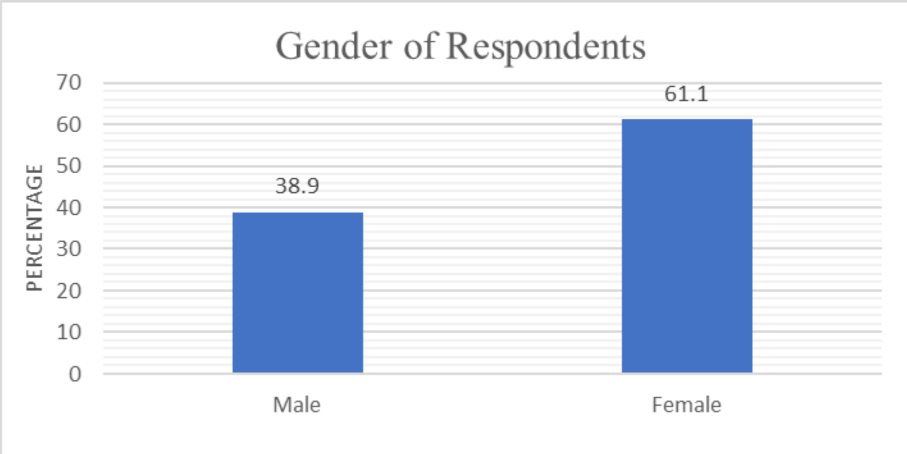

***Figure 4.1*: Gender distribution of Respondents**

4.5.2 Respondents Age

As shown in Figure 4.2, the majority of the participants in this study fall within the age range 18 - 21, followed by the age group 17 and below. Of the 364 students who provided valid questionnaires, 88.1% of the respondents were of the age range of 18 - 21 years, 5.9% fell between 17 and below. The age group of 22 – 25 years formed 5.1% of the respondents while the age 26 and above consisted of 0.8 % of the respondents.

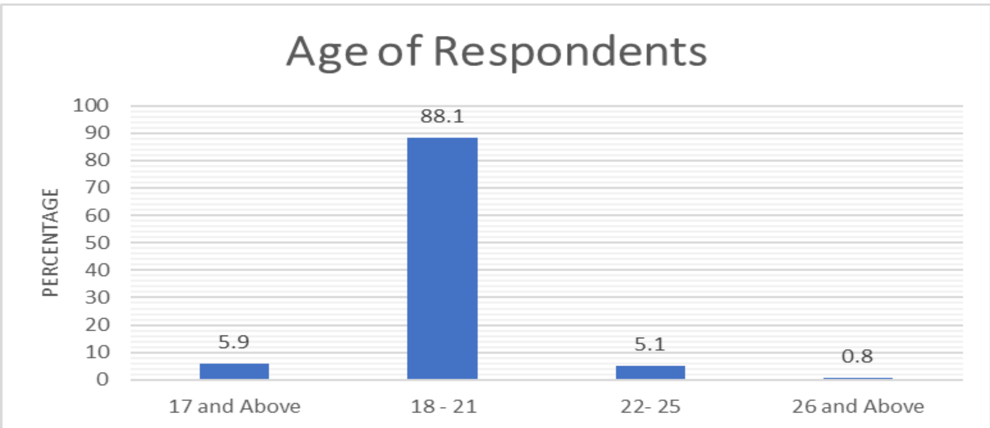

***Figure 4.2*: Age distribution of the respondents**

4.5.3 Racial grouping of participants

The racial grouping of the participants of the study is presented in Figure 4.3. South Africa has an estimated population of 50 million people that are of multiracial origin, with different cultures, and languages (Homer-Dixon & Percival, 2018). According to Elirea Bornman (2016), South Africa ethnic groups are African, White, Coloured and Indian. However, the African ethnic group are the majority of the total population. This study was conducted in Kwazulu-Natal which is dominated by African, while Indians form the second largest population of the province (Naidoo, 2011). With regards to the participant's race sample distribution, majority of the participants in this study were African, followed by Indians, and then the White and coloured participants, respectively.

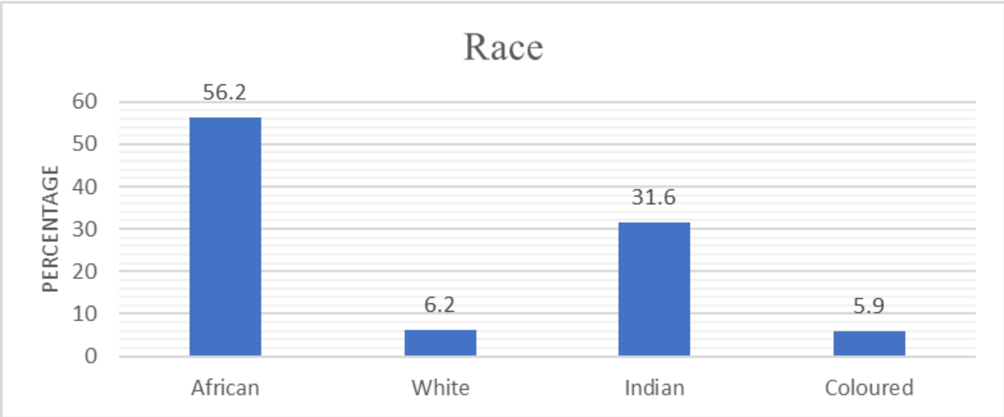

***Figure 4.3*: Race distribution of Respondents**

4.5.4 Respondents Registration per college

The target population was UKZN, PMB Campus. The campus houses 3 colleges namely College of Law & Management Studies, College of Humanities, and College of Agriculture, Engineering and Science. Respondents were asked to indicate the college in which they were registered. As can be seen in Figure 4.4, the majority of the study's participant were registered in college of Agriculture, Engineering and Science, followed by participants that registered with the college of Law & Management studies, and the least number of participants came from the college of humanities.

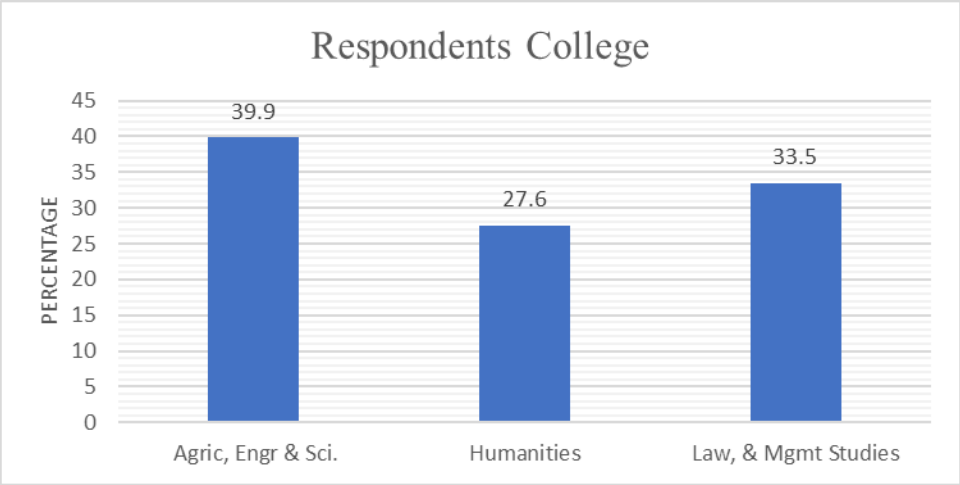

***Figure 4.4*: Registration of respondents per college**

4.5.5 Technology ownership

Participants were asked to indicate the type of technology they have owned/own to ascertain whether they had exposure to or owned some forms of technology prior to joining the university.

As shown in Fig 4.5(A), also presented in Appendix E, 52.4% of the respondents indicated that they did not own a computer before joining the university. However, only 10.5% indicated they only owned it after joining the university. In the smartphone category, Fig 4.5(B), the findings obtained showed that 87.6% of the respondents owned smartphones before joining the university while 7.6% of the respondents indicated they did not own a smartphone until they joined the university. In addition, only 4.9% of the participant indicated that they did not own smartphones. Similarly, the analysis of the data, Figure 4.5(C), also showed that 54.6% of the indicated that they do not own Tablet or iPad while 38.4% of the participants indicated they owned it before joining the university, 7.0% of the participants only owned iPad or tablet when they joined the university. Within the category of laptop computers, Fig4(D), the findings showed that 47.3% of the respondent owned a laptop only after joining the university, similarly 46.2% of the respondents indicated that they owned laptops before they joined the university while 6.5% of the respondents constitute those who did not own a laptop. The findings, within the category of game console, Fig 45(E), showed that 58.9% of the participants did not own a game console, while 37.6% indicated to have owned it before they join the university. Also, 3.7% of the respondents indicated they only owned it after joining the university.

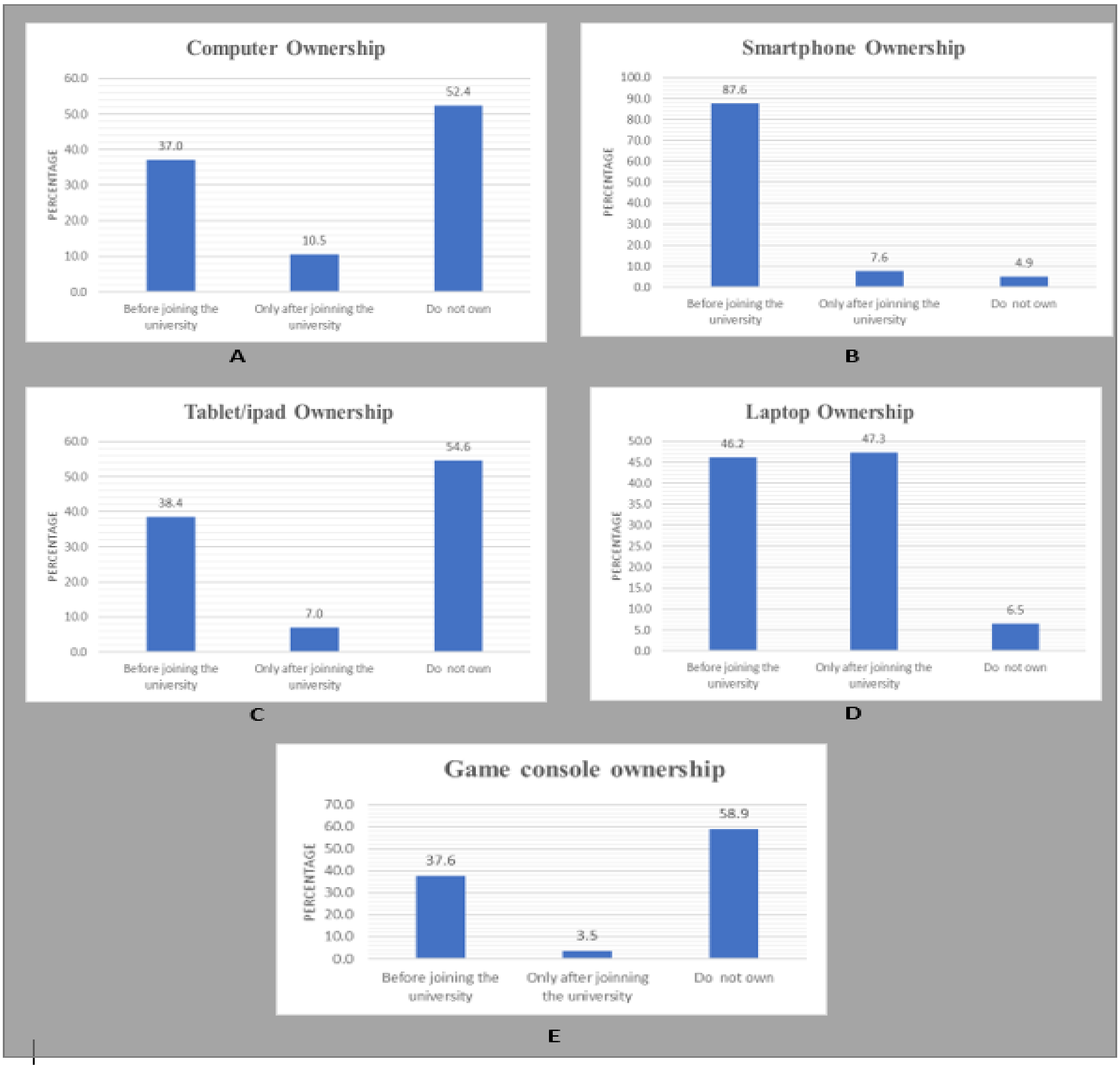

***Figure 4.5*: Information about Technology ownership**

4.5.6 Technology Accessibility

Respondents were asked to indicate their response to questions relating to technology accessibility.

The analysis of this question shows that majority of the respondents (75.7%) had access to the Internet, Fig 4.6(A) (Appendix F), before joining the university. 18.9% of the participants indicated to have had access only when they joined the university while 5.4% indicated they did not have Internet access. The findings also showed that 53.5%, Fig 4.6(B), of the participant had access to computer before joining the university while 39.2% only had access when they joined the university. The remaining 6.5% of the participant constitute those who did not have access to computer. Further analysis of the responses depicted that majority (86.2%), Fig 4.6(C), of the participants have had access to smartphones before joining the university, 10.0% only had access when they joined the university while 2.2% of the participants constitute those who did not have access to smartphones.

Similarly, 47.8% (Fig 4.6(D) of the respondents indicated they have had access to Tablet/iPad before joining the university, while 7.3% indicated they only have access when they joined the university. The remaining 44% of the participants indicated they did not have access to tablet/iPad. In addition, the result obtained from the analysis also showed that 58%, Fig4.6(E) of the participants have had access to laptop before joining the university, 39.2% only have access only when they joined the university, while only 2.2% indicated they did not have access to laptop. Furthermore, the findings, in the category of game console depicted that 39.5%, Fig 4.6(F), of the respondents indicated to have had access to game before coming to university, 4.1% said they only have access when they joined the university, while 56.5% of the participants signifies those who did not have access to game console.

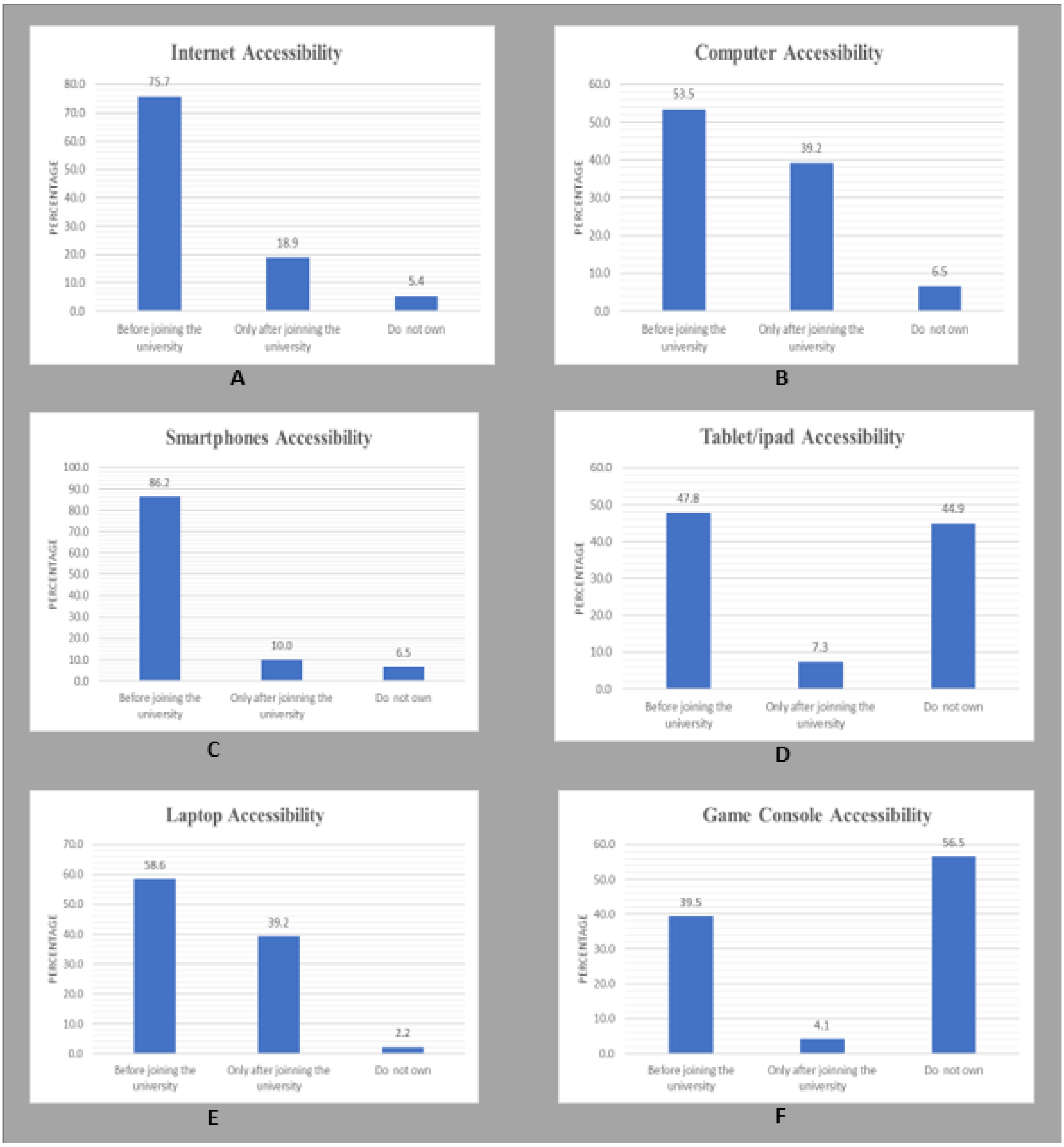

Fig: 4.6 Information about Technology Accessibility

4.5.7 Constructs used in the study

Respondents were asked questions relating to these constructs and this in-turn provided the researcher with a clear insight on the study's research questions.

4.5.7.1 Digital Access divide

The first construct (i.e. digital access divide) was used to determine if students have had access to technology, and to know the type of such technology, prior to joining the university. The result obtained from the analysis of the data depicted that majority (75.7%) of the respondents had Internet access (Appendix G) before joining the university, 5.4% of the respondents indicated they did not have Internet access, while 18.9% indicated they only had access when they joined the university. With regards to computer ownership, more than half of the respondents (52.4%) indicated they did not own a computer, while 37% indicated they owned it before joining the university. While, 10.5% of the respondents indicated they only owned it after joining the university. Similarly, the findings from the analysis also showed that 53.5% of the participant had access to computer before joining the university while 39.2% indicated that they had access only when they joined the university. The remaining 6.5% of the participants indicated they did not have access to computer.

Similarly, 87.5% (Appendix G) of the respondents indicated to have owned smartphones prior to joining the university, 7.6% indicated they only owned smartphones after joining the university, while 4.9% indicated they did not own smartphones. In addition, majority (86.2%) of the participants indicated they smartphones before joining the university, 10.0% indicated they only had access after joining the university while 2.2% of the participants constitute those who did not have access to smartphones.Within the category of Table/ IPad, 54.6% of the indicated that they did not own tablet or iPad while 38.4% of the participants indicated to have owned it before joining the university, 7.0% of the participants indicated they only owned it when they joined the university. Similarly, 47.8% of the respondents indicated they have had access to tablet/iPad before joining the university, while 7.3% indicated they only have access when they joined the university. The remaining 44% of the participant constitutes those who did not have access to tablet/iPad.

The analysis of the responses from the respondents showed that 47.3% (See Appendix G) of the respondents owned a laptop only after joining the university, 46.2% of the respondents indicated that they owned laptops before they joined the university while 6.5% of the respondents constitute those who did not own a laptop. Further analysis revealed that 58% of the participants have had access to laptop before joining the university, 39.2% only had access after they joined the university, while only 2.2% indicated they did not have access to laptop. Furthermore, the statistics also showed that 58.9% of the participants did not own game console, while 37.6% indicated to have owned it before they joined the university. 3.7% of the respondents indicated to have owned it only when they joined the university. Similarly, 39.5% of the respondents indicated they had access before coming to university, 4.1% only had access after joining the university, while 56.5% of the participants signifies those who did not have access to game console. See earlier comment and apply.

4.5.7.2 Digital Capability Divide

Participants were asked to indicate their level of competency with different technology and other ICT applications. Within the category of Internet browsing, data analysis showed that 89.7% (Fig 4:7A - Appendix H) of the respondents are capable of browsing the Internet without help. 5.9% of the participants were unsure of their competency level while 4.4% of the respondent were unable to browse the Internet without help. Similarly, as shown in Fig.7B, 72.9% of the participants indicated that they were competent with using computer, while 20.3% were unsure if they are competent, only 6.8% of the respondents were not competent with the use of computer. Consecutively, over 80% (Fig4.7(C)) of the respondents indicated they were competent with the use of laptop while 2.7% indicated they were not competent, 14.6% of the respondents were unsure of their competency level with the use of laptop. Furthermore, the analysis also showed that 63.8% (Fig: 4.7D) of the participants were competent with tablet/iPad while 25.7% were unsure of their competency level, only 10.6% of the respondents were unable to use tablet/iPad. As shown in Fig4.7(E), 33.3% of the respondents were competent with Kindle while 37.0% were not confident or unsure of their skills. Only 29.8% of the participants were not competent with the use of kindle. The statistics also showed that a larger percentage (Fig:4.7F) of the respondents were competent with the use of smartphones, 5.4% were unsure of their skills, only 3.5% of the participants indicated they were not competent with the use of smartphones. Furthermore, majority of the respondents 86.5% (Fig4.7G) indicated they were comfortable with using technology for learning purposes, 9.2% indicated that they were unsure, while only 4.3% of the participants were unable to use technology for learning purposes.

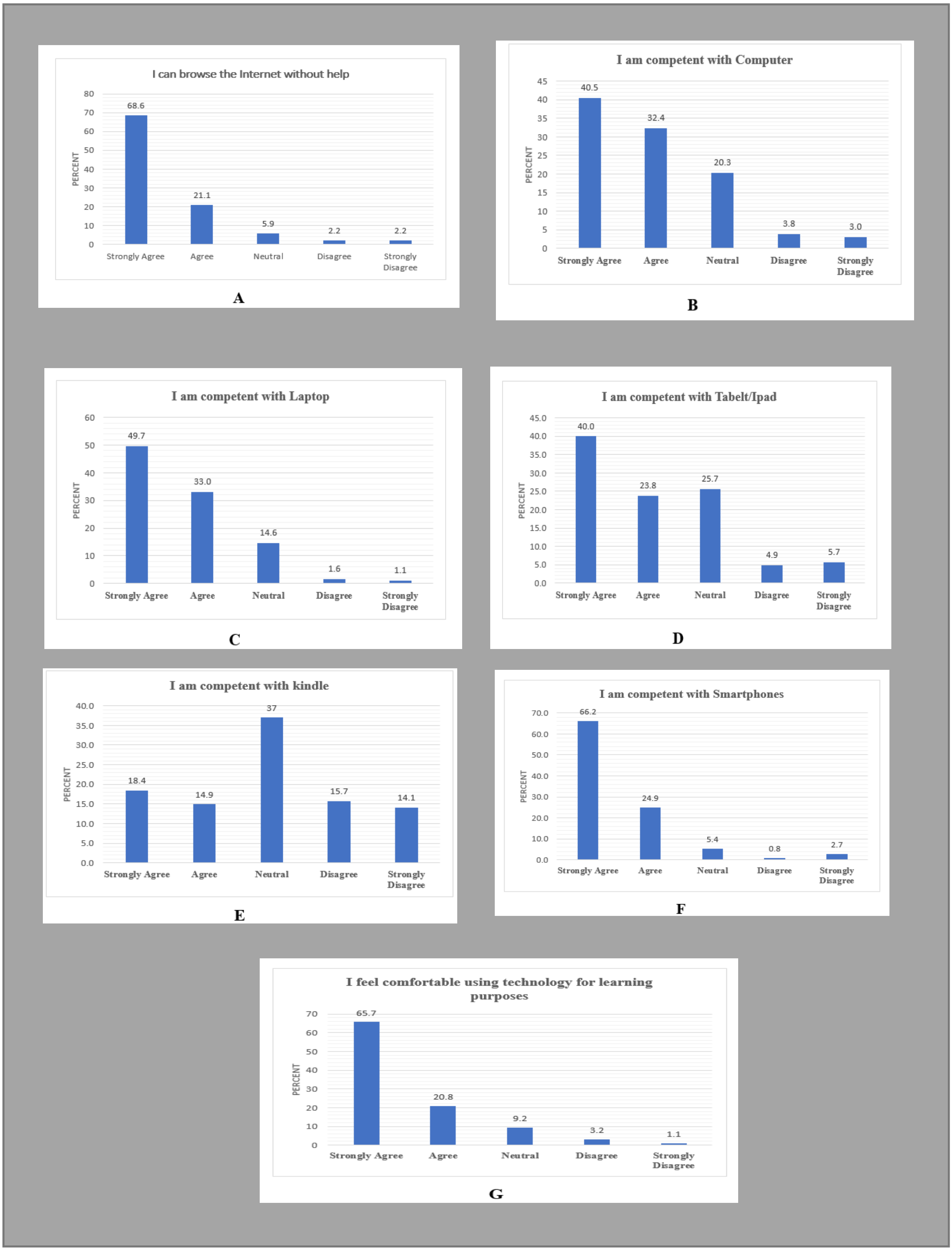

***Figure 4.7*: Information about respondents' level of competence**

4.5.7.3 Digital Outcome Divide

Further investigation was carried out to know if such access or lack of access has improved or negatively affected respondents' study. The statistics obtained showed that majority 87% (Fig 4.8(A)) of the respondents have had access to some form of technology before joining the university while the rest of the participant,13.0% indicated they have not been exposed to any form of technology before joining the university. However, of the 322 students that indicated they have had access, 89% (Fig: 4.8B) indicated that having such access has improved their performance, 9.5% of the respondents were unsure while 1.5% indicated such access has not improved their performance. On the other hand, of the 48 respondents that indicated they did not have access to any forms of technology prior to joining the university, 61.4% (Fig: 4.8C) indicated that not having access to technology before coming to the university has negatively affected their study, 3.2% were unsure while 1.9% of the participants indicated their study has not been negatively affected even though they did not have access to technology before joining the university. In addition, a large percentage, 82.7% of the participants indicated that having access to technology has enhanced their academic performance, only 15.7% indicated they were either not sure or not confident about the usefulness of technology while 1.6% of the participants disagreed (Appendix J).

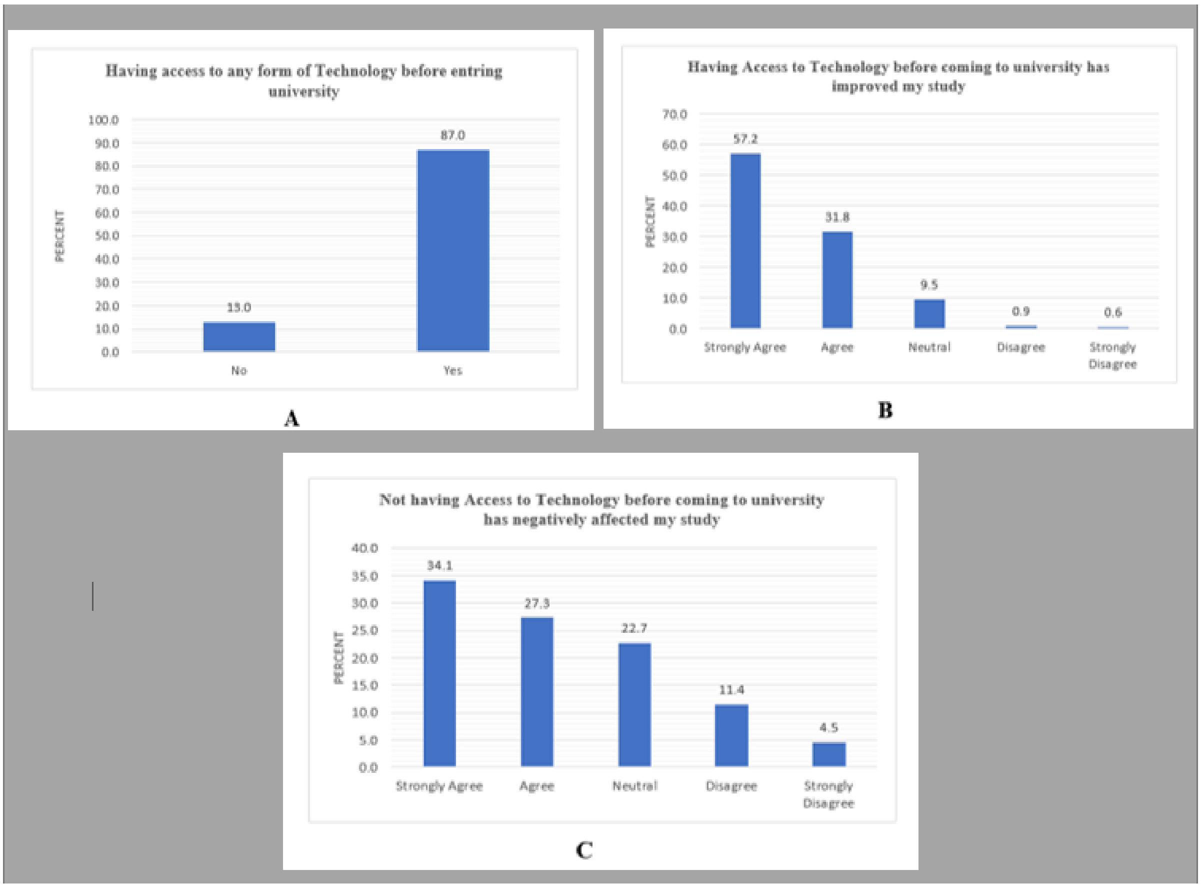

Figure 4.8: **Respondents Access to Technology and their Performance**

4.5.7.4 Perceived Usefulness

The analysed data showed that majority 93.2% (Appendix J) of the respondents find technology useful, 3.2% were either unsure if they find it useful while 3.5% indicated they did not find it useful. Likewise, further analysis showed that a larger percentage 89.7% of the respondents indicated that using technology makes them accomplish learning task quicker, 9.2% were unsure, while only few (1.1%) of the participants indicated using technology does not make them accomplish learning task quicker.

4.5.7.5 Perceived Ease of Use

The analysis of the responses showed that most of the respondents indicated that their interaction with technology is clear and understandable (Appendix E) while 1.9% of the participants disagree. In the same vein, majority find technology easy to use while only 4.8% of the participants indicated they do not. In addition, a significant percentage of 71.1% participants indicated that learning to operate computer is easy while a few, 7.8 % of the respondents disagreed. Further analysis also showed that most of the participants (71.1%) find it easy to download learning material while a small percentage indicated they do not. Similarly, 70% of the participants indicated they find it easy to study online while 7.4% of the respondents indicated they do not. Similarly, majority (86.6%) of the participants find it easy to do assignments on computers, however, 5.4% percentage of the participants indicated they disagree.

Further analysis (See Appendix I) showed that majority (81.4%) of the participants did not find it difficult to navigate the Internet while 18.6% indicated they find it difficult navigating the Internet. Within the category of computer applications, more than average (66.8%) of the respondents were able to use computer applications, however, 33.2% of the participants they find it difficult to use computer applications. Similarly, majority (81.6%) also noted they did not find it difficult to do learning tasks on computer while 18.4% of the participants indicated they find it difficult doing learning task. In addition, the findings obtained also showed that 86.2% of the respondents were able to do online self-studies, while only 13.8% were unable to do online self-studies due to unfamiliarity with technologies. Furthermore, 82.4% of the respondents were able to download informative materials for learning purposes, while few percentage (17.6%) were unable to do so. Similarly, majority of the participants were able to use parts of computer while only few percentages of the respondents indicated they did not know how to use parts of computer.

4.6 Cross Tabulations

Cross tabulations were used to uncover significant relationships existing between different variables that underpin this study. Cross tabulation, according to Gartung, Edholm, Edholm, McNall, and Lew (2001) provides the means to delve into the research findings and evaluate the different variables to make judgements or inferences. Cross tabulation represents the result of the total group, and sub-group of participants which facilitates the examination of existing relationship within the data set. This study also used Chi-square test to determine if a significant relationship exists between variables in the cross tabulation. According to Alan and Cramer (2002); Bryman and Cramer (2012) a Chi-square value greater than 0.05 (Pearson value , $P > 0.05$) implies that no significant relationship exists between the variables under examination. On the other hand, a "P" value less than 0.05 ($P<0.05$) indicates that there is significant relationship between the variables under consideration. For this study, the cross tabulations for the different variables were presented and the P value was observed to determine if a significant relationship exists between variables being tested.

It is important to know that the cross tabulation of the analysis of this study only focused on computer, Internet accessibility and competency level. This is because most universities in South Africa mainly provide computer and the Internet for students to facilitate their studies (Naidoo, 2011; Elirea Bornman, 2016). Similarly, the main technological resources provided by the school in which this study was conducted are computers, and the Internet. In this way, irrespective of student knowledge or background, they are required to use such technologies in the classrooms.

4.6.1 Cross tabulation between Race and Technology Accessibility

The Cross tabulation between respondents' race and Technology accessibility (Table 4.2) shows that of the 117 Indian participants, a higher percentage (95%) of them have had access to some forms of technology before entering the university, while all the colored participants (22) indicated to have had access prior to joining the university. Similarly, of the 23 white participants, 22 participants (95%) indicated they have had access before joining university, while 77.9% of participants who are African indicated to have had access to some forms of technology before joining the university.

Table 4.2: Cross tabulations between Race and Technology Accessibility

Race * Did you have access to Any form of Technology before entering University Crosstabulation					
			Did you have access to Any form of Technology before entering University		Total
			NO	Yes	
Race	African	Count	46	162	208
		% within Race	22.1%	77.9%	100.0%
	White	Count	1	22	23
		% within Race	4.3%	95.7%	100.0%
	Indian	Count	1	116	117
		% within Race	0.9%	99.1%	100.0%
	Colored	Count	0	22	22
		% within Race	0.0%	100.0%	100.0%
Total		Count	48	322	370
		% within Race	13.0%	87.0%	100.0%

Similarly, the chi-square results obtained (P = 0.00) implies there's a significant relationship, P<0.005 between respondent race and access to technology (See Appendix L). It can be deduced that Indian, White and Colored students are more likely to have had access to technology than African, before joining university.

4.6.2 Cross tabulation between Gender and Technology Accessibility

The cross tabulation of the analysis between gender and technology accessibility (Table 4.3) showed that a higher percentage of female (87.2%) respondents have access to technology regardless of race. This could be due to the ongoing support provided to females towards entering Science Technology Engineering and Mathematics (STEM) fields (Raja, 2016). The South African government shows motivation towards encouraging young females by providing funding for the STEM streams (Jones & Bridges, 2016). Also, the results may be due to the higher percentage of female students found in universities.

Table 4.3: Cross tabulation between Gender and Technology Accessibility

Gender * Did you have access to Any form of Technology before entering University Cross tabulation					
			Did you have access to Any form of Technology before entering University		Total
			NO	Yes	
Gender	Male	Count	19	125	144
		% within Gender	13.2%	86.8%	100.0%
	Female	Count	29	197	226
		% within Gender	12.8%	87.2%	100.0%
Total		Count	48	322	370
		% within Gender	13.0%	87.0%	100.0%

The Chi-square result for the cross tabulation (P>0.05) shows that there is no significant relationship between respondents' gender and technological access (See Appendix L).

4.6.3 Cross tabulation between Technology access and Computer competency level

The below Table 4.4 indicates that majority of the participants (76.4%) who have had access to technology prior to joining the university indicated to be competent in using computer. On the other hand, from the participants that indicated they did not have access to technology, 50% indicated they are competent in using computer while 29% were unsure about their competency level with computer. It can be established that prior exposure to technology before coming to the university contributes to learners' level of confidence and skills in using computer for learning purposes.

Table 4.4: Crosstabs between Technology access and Computer Competency Level

Did you have access to Any form of Technology before entering University * I am competent in using Desktop Computer Crosstabulation								
			I am competent in using Desktop Computer					
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Did you have access to Any form of Technology before entering University	NO	Count	3	7	14	13	11	48
		% within Did you have access to Any form of Technology before entering University	6.3%	14.6%	29.2%	27.1%	22.9%	100.0%
	Yes	Count	8	7	61	107	139	322
		% within Did you have access to Any form of Technology before entering University	2.5%	2.2%	18.9%	33.2%	43.2%	100.0%
Total		Count	11	14	75	120	150	370
		% within Did you have access to Any form of Technology before entering University	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

Similarly, the chi-square value for technology access and computer competency level variables ($P = 0.00$) confirms that there exists a significant relationship ($P<0.05$, Appendix L) between students' access to technology before joining the university and computer skills. It can be implied that students who have had access to some form of technology are likely to be more competent than those who only have access after joining the university.

4.6.4 Cross tabulation between Access to technology and Internet competency

The cross tabulation of the analysis of the respondents showed that majority, 92.3% of the respondents who have had access to technology prior to coming to the university were competent with Internet browsing as shown in Table 4.5. Similarly, of the respondents who indicated they did not have access to technology prior to joining the university, 72.9% indicated they are competent in browsing the Internet. This can be attributed to the efforts of the South African government in bridging the access divide in the universities through the provision of technological facilities (Botha, Herselman, & van Greunen, 2010).

On the other hand, it can be seen that a small percentage, 3.6% of the participants were not competent with Internet browsing even though they indicated to have had access prior to joining the university, this result supports Riggins and Dewan (2005) study which shows that some individuals may decide not to use technology, consequently, affects their usage skills. This often occurs due to an individual's lack of interest to capitalize on technology as a resource. Similarly, 12.6% were not competent in browsing the Internet although they indicated to not have had access before coming the university. Nevertheless, there is provision for technological resources for students regardless of academic level, this implies that there will always be a skill gap among students regardless of the current accessibility provided by the institutions.

Table: 4.5 Cross Tabulation between Technology Access and Internet Browsing Competency Level

Did you have access to Any form of Technology before entering University * I can browse the internet without Help Crosstabulation								
			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Did you have access to Any form of Technology before entering University	NO	Count	3	3	7	16	19	48
		% within Did you have access to Any form of Technology before entering University	6.3%	6.3%	14.6%	33.3%	39.6%	100.0%
	Yes	Count	5	5	15	62	235	322
		% within Did you have access to Any form of Technology before entering University	1.6%	1.6%	4.7%	19.3%	73.0%	100.0%
Total		Count	8	8	22	78	254	370
		% within Did you have access to Any form of Technology before entering University	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Similarly, the result of the Chi-square test (P = 0.00) obtained implies that there is significant relationship (See Appendix L) between students' prior access to any form of technology and Internet browsing competency level. It can therefore be inferred that student who have had prior access to technology prior to joining the university are likely to be more competent with Internet browsing than those who only have access after joining the university.

4.6.5 Cross tabulation between computer ownership and competency level

A percentage of 89%, Table 4.6, of the participants indicated to have owned a computer before coming the university are competent in using computer. Similarly, 59% of the respondents who only have access or owned it when they joined the university were competent. However, it is interesting to know that, a reasonable percentage (64.5%) of the participants indicated they were competent in using computer even though they never owned it, this finding demonstrates the effort of the institution in bridging the digital gap among students. In addition, for those participants who indicated they have owned computer, regardless of when, a small percentage indicated that they were not competent in using it. This reaffirms the notion that digital divide goes beyond accessibility to or ownership of technology (Riggins & Dewan, 2005).

Table 4.6: Cross Tabulation between Computer ownership and computer competency level

Computer Ownership * I am competent in using Desktop Computer Crosstabulation								
			I am competent in using Desktop Computer					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	
Computer Ownership	Before coming to university	Count	3	1	11	37	85	137
		% within Computer Ownership	2.2%	0.7%	8.0%	27.0%	62.0%	100.0%
	Only after joining the university	Count	2	1	13	14	9	39
		% within Computer Ownership	5.1%	2.6%	33.3%	35.9%	23.1%	100.0%
	Do not own	Count	6	12	51	69	56	194
		% within Computer Ownership	3.1%	6.2%	26.3%	35.6%	28.9%	100.0%
Total		Count	11	14	75	120	150	370
		% within Computer Ownership	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

In the same vein, the Chi-square result (P= 0.00, Appendix L) obtained shows that there is a significant relationship (P <0.05) between level of competency with computer and computer ownership. It can be established that students who have owned computer or have access before joining the university are likely to be more competent with it than those who did not have access or only own it after joining the university.

4.6.6 Cross tabulation between Internet accessibility and Internet competency level

The cross tabulation of the analysis of the responses showed that a large percentage, 92% of participants (Table 4.7) who have access to the Internet before coming to the university were more competent in browsing the Internet than those who either not have access or have it after joining the university (82.5%, 79.5%). This implies that students who have had access to the Internet before joining the university are likely to have acquired confidence and skills in Internet browsing, which in-turn leads to high competency level (Tien & Fu, 2008). However, within the category of those who only have access to the Internet after joining the university and those who did not, few percentages (3%) were unable to browse the Internet.

Table 4.7: Cross tabulation between Internet Accessibility and Internet competency

Internet Accessibility * I can browse the internet without Help								
			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Accessibility	Before coming to university	Count	5	3	11	48	202	269
		% within Internet Accessibility	1.9%	1.1%	4.1%	17.8%	75.1%	100.0%
	Only after joining the university	Count	2	2	6	17	30	57
		% within Internet Accessibility	3.5%	3.5%	10.5%	29.8%	52.6%	100.0%
	Do not own	Count	1	3	5	13	22	44
		% within Internet Accessibility	2.3%	6.8%	11.4%	29.5%	50.0%	100.0%
Total		Count	8	8	22	78	254	370
		% within Internet Accessibility	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Similarly, the Chi-square result (P=0.00, Appendix L) signifies a significant relationship (P < 0.05) between Internet ownership or accessibility irrespective of when, and Internet browsing competency. It can be established that access to Internet prior to joining the university influences learners browsing skills.

4.6.7 Cross tabulation between Access to Any Form of Technology and Use of Technology for Learning Purposes

Table 4.8 shows that a higher percentage (87.4%, 81.3%) of both participants who have had access to any form of technology prior to coming the university and those who did not were comfortable with using technologies for learning purposes. However, it is interesting to find a few percentages of those who have had access to some forms of technology before coming to the university indicating they were not comfortable with it for learning purposes.

Table 4.8: Cross tabulation between Access to Technology and level of comfort with using technologies for learning purposes

Did you have access to Any form of Technology before entering University * I feel comfortable using technologies for learning purposes Crosstabulation

			I feel comfortable using technologies for learning purposes					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Did you have access to Any form of Technology before entering University	NO	Count	0	3	6	13	26	48
		% within Did you have access to Any form of Technology before entering University	0.0%	6.3%	12.5%	27.1%	54.2%	100.0%
	Yes	Count	4	9	28	64	217	322
		% within Did you have access to Any form of Technology before entering University	1.2%	2.8%	8.7%	19.9%	67.4%	100.0%
Total		Count	4	12	34	77	243	370
		% within Did you have access to Any form of Technology before entering University	1.1%	3.2%	9.2%	20.8%	65.7%	100.0%

Similarly, the result of the Chi-square (P=0.29, Appendix L) implies that no significant relationship exists between student's access to any form of technology before coming university and their level of comfort with technologies for leaning purposes (P>0.05). In this way, it can be deduced that regardless of the form of technology learners have been exposed to, prior to joining the university, it does not guarantee they would be comfortable with using it for learning purposes.

4.6.8 Cross tabulation between Gender and Level of Competency with Desktop Computer

From the cross tabulation (Table 4.9) of the analysis of the respondents, a higher percentage of both male and female participants (75.7%, 71.2% respectively) indicated they were competent with using computer. Similarly, few percentages of both male and female's respondent claimed they were not competent, it can be established that the existing gender difference in technological skills is gradually decreasing.

Table 4.9: Cross tabulation between Gender and respondent's competency level with computer

			I am competent in using Desktop Computer					
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Male	Count	4	3	28	47	62	144
		% within Gender	2.8%	2.1%	19.4%	32.6%	43.1%	100.0%
	Female	Count	7	11	47	73	88	226
		% within Gender	3.1%	4.9%	20.8%	32.3%	38.9%	100.0%
Total		Count	11	14	75	120	150	370
		% within Gender	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

Similarly, in chi square test conducted, the result obtained (P=0.68 See appendix L) implies that there is no significant relationship between gender and level of competency with computer skills ($P > 0.05$).

4.6.9 Cross tabulation between Gender and level of competency with Internet Browsing

The cross tabulation conducted between respondents' gender and level of competency with Internet browsing shows (Table 4-10) that a higher percentage of both male (89.6%) and female (89.8%) participants were competent with Internet browsing. However, few percentages of the respondents (both male and Female) also indicated that they were not competent with Internet browsing. The higher percentage of both male and female participants implies that both male and female learners are competent with the Internet browsing and that the existing skill gap in Internet browsing is decreasing.

Table 4.10: Crosstab between Gender and level of competency with Internet Browsing

			I can browse the internet without Help					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Male	Count	2	3	10	30	99	144
		% within Gender	1.4%	2.1%	6.9%	20.8%	68.8%	100.0%
	Female	Count	6	5	12	48	155	226
		% within Gender	2.7%	2.2%	5.3%	21.2%	68.6%	100.0%
Total		Count	8	8	22	78	254	370
		% within Gender	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Similarly, the chi-square test conducted between the variables produced P = 0.09, which indicates that there is no significant relationship (P>0.05) between gender and level of competency with Internet browsing (Appendix L). It can be deduced both male and female are competent with Internet browsing and that gender status does not influence student's competency level.

4.6.10 Cross tabulation between Gender and Comfortability with the Use of Technology for Learning Purposes

Gender was cross tabulated against using technology for learning purpose, as shown in Table 4.11, a higher percentage of both male and female (85.4%, 87.1%) participants indicated that they were comfortable with using technologies for learning purposes. However, few percentages of both male and female were not comfortable with using technology for learning purposes. It can therefore be deduced that that most both male and feel are comfortable with using technology for learning purposes.

Table 4.11: Cross Tabulation between Gender and I feel comfortable using technology for learning purposes

			I feel comfortable using technologies for learning purposes					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Male	Count	2	4	15	29	94	144
		% within Gender	1.4%	2.8%	10.4%	20.1%	65.3%	100.0%
	Female	Count	2	8	19	48	149	226
		% within Gender	0.9%	3.5%	8.4%	21.2%	65.9%	100.0%
Total		Count	4	12	34	77	243	370
		% within Gender	1.1%	3.2%	9.2%	20.8%	65.7%	100.0%

In the same vein, the chi square result obtained (P=0.930, See Appendix L) for this variable implies that there's no significant relationship (P>0.5) between gender status and the level of competency with the use of technologies for learning purposes. It can be deduced that students' level of competency with using technologies for learning purposes is not a function of their gender status.

4.6.11 Cross tabulation between Internet Accessibility and Academic Performance

Table 4-12 below shows that a higher percentage (92.4%) of the respondents who have had access to the Internet before coming to the school indicated that it has improved their current study. Similarly, out of the 51 respondents those who only have access after joining the university, a reasonable percentage (78.4%) of them indicated that their current study has improved with access to the Internet. It can be deduced that those who have had access to the Internet before joining the university are likely to perform better than those who did not have or only have it after joining the school.

Table 4.12: Cross tabulation between Internet accessibility and performance

Internet Accessibility * Having access to Technology before coming to University has improved my current study Crosstabulation								
			Having access to Technology before coming to University has improved my current study					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Accessibility	Before coming to university	Count	2	0	18	90	153	263
		% within Internet Accessibility	0.8%	0.0%	6.8%	34.2%	58.2%	100.0%
	Only after joining the university	Count	0	3	8	12	28	51
		% within Internet Accessibility	0.0%	5.9%	15.7%	23.5%	54.9%	100.0%
	Do not have access to	Count	0	0	5	2	6	13
		% within Internet Accessibility	0.0%	0.0%	38.5%	15.4%	46.2%	100.0%
Total		Count	2	3	31	104	187	327
		% within Internet Accessibility	0.6%	0.9%	9.5%	31.8%	57.2%	100.0%

Similarly, the chi-square test conducted between the variables generated P = 0.00, (See appendix L) indicates that there is a significant relationship ($P<0.05$) between Internet accessibility and student performance. It can be deduced that Internet accessibility is crucial for better academic performance, additionally those who have had access to Internet before joining the university are likely to perform better in their study than their counterpart who only have access after joining university.

4.6.12 Cross tabulation between Computer Accessibility and Academic Performance

The cross tabulation of the analysis of the responses showed that a higher percentage (74%) of the participants (Table 4-13) indicated that technology accessibility has improved their current study regardless of when they have access, before or after joining the university. On the other hand, few percentages of the respondents indicated that technology has improved their performance even though they did not have access to computer. This can be attributed to the efforts of the university in bridging the technology gap among students.

Tab 4-13 Cross Tabulation between Computer accessibility and academic performance

Computer Accessibility * Having access to Technology before coming to University has improved my current study Crosstabulation								
			Having access to Technology before coming to University has improved my current study					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Computer Accessibility	Before coming to university	Count	2	1	12	57	120	192
		% within Computer Accessibility	1.0%	0.5%	6.3%	29.7%	62.5%	100.0%
	Only after joining the university	Count	0	1	16	42	57	116
		% within Computer Accessibility	0.0%	0.9%	13.8%	36.2%	49.1%	100.0%
	Do not have access to	Count	0	1	3	5	10	19
		% within Computer Accessibility	0.0%	5.3%	15.8%	26.3%	52.6%	100.0%
Total		Count	2	3	31	104	187	327
		% within Computer Accessibility	0.6%	0.9%	9.5%	31.8%	57.2%	100.0%

Similarly, in the chi square test conducted, the result obtained (P=0.07 See appendix G) implies that there is no significant (P>0.05) relationship between computer ownership or accessibility and performance.

4.6.13 Cross tabulation between Race and Level of Competency with Computer

From the cross tabulation between the variable race and competency with computer (Table 4-14) a higher percentage of the participants from each of race were competent with using computer. However, of 208 African participants, a reasonable percentage 26.9% (56) were unsure whether or not they are competent with using computer while 7.7% (16) indicated they were not competent with using computer.

Table 4.14: Crosstab between Race and Level of competency with Computer

Crosstab								
			I am competent in using Desktop Computer					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	7	9	56	71	65	208
		% within Race	3.4%	4.3%	26.9%	34.1%	31.3%	100.0%
	White	Count	1	0	2	8	12	23
		% within Race	4.3%	0.0%	8.7%	34.8%	52.2%	100.0%
	Indian	Count	2	5	17	32	61	117
		% within Race	1.7%	4.3%	14.5%	27.4%	52.1%	100.0%
	Coloured	Count	1	0	0	9	12	22
		% within Race	4.5%	0.0%	0.0%	40.9%	54.5%	100.0%
Total		Count	11	14	75	120	150	370
		% within Race	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

In the Chi-square carried out, the result produced (P=0.07) implies there is no significant relationship (P>0.05) between race and students' level of competency with using computer.

4.6.14 Cross tabulation between Race and Internet Competency

The cross tabulation of the analysis of the responses showed that a higher percentage of participants from each race were competent with Internet browsing (Table 4-15). However, of 208 African participants, 9.1% (19) were unsure about their competency level while 6.8% (14) claimed they were not competent with Internet browsing.

Table 4.15 Cross tabulation between Race and Internet competency

Crosstab								
			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	7	7	19	54	121	208
		% within Race	3.4%	3.4%	9.1%	26.0%	58.2%	100.0%
	White	Count	1	0	2	1	19	23
		% within Race	4.3%	0.0%	8.7%	4.3%	82.6%	100.0%
	Indian	Count	0	1	1	22	93	117
		% within Race	0.0%	0.9%	0.9%	18.8%	79.5%	100.0%
	Colored	Count	0	0	0	1	21	22
		% within Race	0.0%	0.0%	0.0%	4.5%	95.5%	100.0%
Total		Count	8	8	22	78	254	370
		% within Race	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Similarly, the chi-square test conducted between the variables generated P = 0.00, (See appendix L) which indicates that there is a significant relationship ($P < 0.05$) between race and student's competency level with the Internet.

4.6.15 Cross tabulation between Race and Difficulty with the use of Computer Application Programs

From the cross tabulation (Table 4.16) between the variables Race and I find it difficult to use computer application programs, a few percentage of the participants from each race except African indicated they find it difficult to use computer application programs. Out of the 208 African participants, 47.6% (99) indicated they find it difficult to use computer application programs.

Table 4.16: Crosstabulation between Race and difficulty with using computer application programs

Race * I find it difficult to use computer application programs e.g. MS Word Cross tabulation					
			I find it difficult to use computer application programs e.g. MS Word		Total
			NO	Yes	
Race	African	Count	109	99	208
		% within Race	52.4%	47.6%	100.0%
	White	Count	21	2	23
		% within Race	91.3%	8.7%	100.0%
	Indian	Count	98	19	117
		% within Race	83.8%	16.2%	100.0%
	Colored	Count	19	3	22
		% within Race	86.4%	13.6%	100.0%
Total		Count	247	123	370
		% within Race	66.8%	33.2%	100.0%

In the chi-square test carried out between the variables Race and difficulty with the use computer application program, the result obtained ($P = 0.00$) implies that there is a significant relationship ($P<0.05$ Appendix L) between race and competency level with using computer application program. It can be deduced from this relationship that students from other race except African are likely to be more competent with computer application programs.

4.6.16 Cross tabulation between Race and difficulty with Internet navigation

From the cross tabulation of the analysis of the responses (Table 4.17) a high percentage of the participants from each race indicated they did not find it difficult to navigate on the Internet. However, of the 208 African participants, 28% (60) indicated they find it difficult to navigate the Internet.

Table 4.17: Cross tabulation between Race and difficulty with navigating the Internet

Race * I find it difficult to navigate on the Internet Cross tabulation					
			I find it difficult to navigate on the Internet		Total
			NO	Yes	
Race	African	Count	148	60	208
		% within Race	71.2%	28.8%	100.0%
	White	Count	22	1	23
		% within Race	95.7%	4.3%	100.0%
	Indian	Count	111	6	117
		% within Race	94.9%	5.1%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	301	69	370
		% within Race	81.4%	18.6%	100.0%

In the same vein, in the chi-square test conducted, a Pearson value of 0.00 ($P = 0.00$) was obtained which indicates that a significant relationship exists ($P<0.05$, Appendix L) between the variable Race and difficulty with Internet navigation. From this result, it can therefore be deduced that Indians, White and Colored students are likely to be more competent with navigating the Internet than Africans.

4.6.17 Cross tabulation between Race and Difficulty with Doing Learning Tasks on a Computer due to Unfamiliarity with Technology

Base on the cross tabulation (Table 4.18) conducted between the variables, Race and difficulty with doing learning task on computer due to unfamiliarity with technology, majority of the participants from all the races indicated that they did not find it difficult to do learning tasks on computer. However, 26.9% (56) of African participants indicated they find it difficult to do learning task on computers due to unfamiliarity with technology.

Table 4.18: Cross tabulation between Race and Difficulty with Doing Learning Tasks on a Computer

Race * I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology Cross tabulation					
			I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology		
			No	Yes	Total
Race	African	Count	152	56	208
		% within Race	73.1%	26.9%	100.0%
	White	Count	22	1	23
		% within Race	95.7%	4.3%	100.0%
	Indian	Count	108	9	117
		% within Race	92.3%	7.7%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	302	68	370
		% within Race	81.6%	18.4%	100.0%

From the Chi-square test conducted, the result obtained (P = 0.00) shows that a significant relationship (P<0.005 Appendix L) exist between student's race and performing academic related task on computers.

4.6.18 Cross tabulation between Race and Difficulty with Conducting Online Self-Studies

Base on the cross tabulation (Table 4-19) between the variables "Race" and difficulty with online study, all the White participants were able to do online self-study. Similarly, majority of Indians and Colored and African participants indicated they can do online self-studies. However, of the 208 African participants, reasonable percentage 19.2% (40) claimed they cannot do online self-studies.

Table 4.19: Cross tabulation between Race and difficulty with doing online self-studies

Race * I cannot do online self-studies due to my unfamiliarity with technologies Cross tabulation					
			I cannot do online self-studies due to my unfamiliarity with technologies		
			No	Yes	Total
Race	African	Count	168	40	208
		% within Race	80.8%	19.2%	100.0%
	White	Count	23	0	23
		% within Race	100.0%	0.0%	100.0%
	Indian	Count	108	9	117
		% within Race	92.3%	7.7%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	319	51	370
		% within Race	86.2%	13.8%	100.0%

In the chi-square test carried out between the variables, the result obtained (P = 0.05) implies that there is no significant relationship (P<0.05 Appendix L) between student's race and doing online self-study.

4.6.19 Crosstabulation between Race and Difficulty with downloading Informative materials online to support learning.

The cross tabulation of the analysis (Table 4-20) of the responses showed that a higher percentage of participants from each race were competent with downloading informative materials online to support their learning. However, of the 208 African respondents, 24.5% (51) indicated were unable to download informative materials to support their learning.

Table 4.20: Crosstabulation between Race and difficulty with downloading informative learning materials

Race * I find it difficult to download Informative materials online to support my learning Cross tabulation					
			I find it difficult to download Informative materials online to support my learning		Total
			NO	Yes	
Race	African	Count	157	51	208
		% within Race	75.5%	24.5%	100.0%
	White	Count	23	0	23
		% within Race	100.0%	0.0%	100.0%
	Indian	Count	105	12	117
		% within Race	89.7%	10.3%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	305	65	370
		% within Race	82.4%	17.6%	100.0%

The Chi-Square test conducted produced a Pearson value of 0.01 (P = 0.01), implying a significant relationship (P< 0.05 Appendix L) between student's race and being able to download Informative materials online for learning purposes.

4.6.20 Cross tabulation between Race and Perceived Usefulness

Both Cross tabulation (See Appendix H) and Chi-square test (Table 4.21) were conducted on variables; Race and Perceived usefulness. The perceived usefulness (PU) constructs contains three variables, as described below;

V1: I do find technology useful

V2: Using technology makes me accomplish my learning tasks quicker

V3: Having access to technology has enhanced my academic performance.

In the chi square test conducted between race and the three variables (perceived usefulness), the results obtained for each variable implies that no significant relationship (P>0.05) exists between student race and the variables.

Table 4-21 Chi-Square Test result between Race and Perceived usefulness

		V1	V2	V3
Race	Chi-Square Value	8.158	9.801	12.588
	Asymp Sig. Value (P-Value)	0.77	0.63	0.40

P<0.05= significant Relationship

Similarly, the cross tabulation (Appendix H) between the race and the three constructs (Perceived usefulness) showed that majority of the participants from each of the race indicated that technology has improved their performances and that they find technology useful. In addition, a high percentage of the respondent also indicated that technology makes them accomplish their learning task quickly. From this finding, it can be deduced that the use of technology by the students is crucial for the betterment of their academic performance.

4.6.21 Cross tabulation between Race and Perceived Ease of Use

A cross tabulation and chi square test were also conducted between Race and the Perceived ease of use (PEOU). The construct, PEOU is made up of six variables, and they are represented by the following, v1, v2, v3, v4, v5, v6. The variables are listed below:

V1: My interaction with technology is clear and understandable.

V2: I find technology easy to use.

V3: Learning to operate computer is easy for me.

V4: I find it easy to download learning materials.

V5: I find it easy to study online.

V6: I find it easy to do my assignments on computers.

The Chi-Square test conducted between the variables Race and Perceived ease of use, showed that five of the variables have significant relationship with Race. The variables are v1, v2, v3, v4 and v6. In this way, the five variables (Table 4.22) form the basis for the inference.

Table 4-22: Chi-Square test result between race and Perceived ease of use

		V1	V2	V3	V4	V5	V6
Race	Chi-Square Value	36.231	43.764	43.417	27.205	14.634	26.943
	Asymp Sig. Value(P-Value)	*0.00	*0.00	*0.00	*0.00	0.26	*0.00

***P<0.05= significant Relationship**

In the cross tabulation between Race and v1 (Table 4.24 See Appendix L) a higher percentage of the participants from each race indicated that their interaction with technology is clear and understandable. However, of the 208 African participants, 20.7% (43) were unsure whether their interaction with technology is clear and understandable. Similarly, according to Table 4.25 & 4.26, majority of the respondents claimed that they find technology easy to use and that learning to use computer is easy, although few percentages of African participants were unsure whether learning to use computer is easy. Furthermore, majority of the participants from each of the race indicated that they are capable of doing several learning tasks such as downloading of learning materials and doing assignments (Table 4.27 & 4.28). Thus, it can be inferred that having an understanding of technologies and its usage does not depend on racial status.

Table 4.24: Chi-Square test result between Race and Perceived ease of use (v1)

Crosstab							
			My Interaction with technology is clear and Understandable				
			Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	7	43	84	74	208
		% within Race	3.4%	20.7%	40.4%	35.6%	100.0%
	White	Count	0	1	6	16	23
		% within Race	0.0%	4.3%	26.1%	69.6%	100.0%
	Indian	Count	0	6	45	66	117
		% within Race	0.0%	5.1%	38.5%	56.4%	100.0%
	Colored	Count	0	0	11	11	22
		% within Race	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	7	50	146	167	370
		% within Race	1.9%	13.5%	39.5%	45.1%	100.0%

Table 4.25 Chi-Square test result between Race and Perceived ease of use (v2)

Crosstab								
			I find technology easy to use					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	1	16	34	80	77	208
		% within Race	0.5%	7.7%	16.3%	38.5%	37.0%	100.0%
	White	Count	1	0	0	6	16	23
		% within Race	4.3%	0.0%	0.0%	26.1%	69.6%	100.0%
	Indian	Count	0	0	7	43	67	117
		% within Race	0.0%	0.0%	6.0%	36.8%	57.3%	100.0%
	Colored	Count	0	0	0	11	11	22
		% within Race	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	2	16	41	140	171	370
		% within Race	0.5%	4.3%	11.1%	37.8%	46.2%	100.0%

Table 4.26: Chi-Square test result between Race and Perceived of use (v3)

Crosstab

			Learning to operate computer is easy					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	2	23	54	71	58	208
		% within Race	1.0%	11.1%	26.0%	34.1%	27.9%	100.0%
	White	Count	1	0	1	6	15	23
		% within Race	4.3%	0.0%	4.3%	26.1%	65.2%	100.0%
	Indian	Count	0	3	19	32	63	117
		% within Race	0.0%	2.6%	16.2%	27.4%	53.8%	100.0%
	Colored	Count	0	0	4	5	13	22
		% within Race	0.0%	0.0%	18.2%	22.7%	59.1%	100.0%
Total		Count	3	26	78	114	149	370
		% within Race	0.8%	7.0%	21.1%	30.8%	40.3%	100.0%

Table 4-27: Chi-Square test result between Race and Perceived ease of use (v4)

Crosstab

			I find it easy to download learning material					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree	Total
Race	African	Count	2	14	30	67	95	208
		% within Race	1.0%	6.7%	14.4%	32.2%	45.7%	100.0%
	White	Count	0	0	1	5	17	23
		% within Race	0.0%	0.0%	4.3%	21.7%	73.9%	100.0%
	Indian	Count	0	0	9	32	76	117
		% within Race	0.0%	0.0%	7.7%	27.4%	65.0%	100.0%
	Colored	Count	0	0	1	5	16	22
		% within Race	0.0%	0.0%	4.5%	22.7%	72.7%	100.0%
Total		Count	2	14	41	109	204	370
		% within Race	0.5%	3.8%	11.1%	29.5%	55.1%	100.0%

Table 4.28: Chi-Square test result between Race and Perceived ease of use (v6)

Crosstab

			I find it easy to do my assignment on computers					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	7	11	38	64	88	208
		% within Race	3.4%	5.3%	18.3%	30.8%	42.3%	100.0%
	White	Count	0	0	2	4	17	23
		% within Race	0.0%	0.0%	8.7%	17.4%	73.9%	100.0%
	Indian	Count	0	2	12	38	65	117
		% within Race	0.0%	1.7%	10.3%	32.5%	55.6%	100.0%
	Colored	Count	0	0	0	6	16	22
		% within Race	0.0%	0.0%	0.0%	27.3%	72.7%	100.0%
Total		Count	7	13	52	112	186	370
		% within Race	1.9%	3.5%	14.1%	30.3%	50.3%	100.0%

4.6.22 Cross tabulation between Access to Any Form of Technology before Coming to the University and Perceived Ease of Use (PEOU)

Both Cross tabulation and Chi-square test (See Appendix I) were conducted between variables; access to any form of technology before coming to the university and Perceived ease of use. The perceived ease of use (PEOU) constructs contains six variables, represented by the following acronyms, v1, v2, v3, v4, v5, v6. The variables are described below;

V1: My interaction with technology is clear and understandable.

V2: I find technology easy to use.

V3: Learning to operate computer is easy for me.

V4: I find it easy to download learning materials.

V5: I find it easy to study online.

V6: I find it easy to do my assignments on computers.

The Chi-Square test conducted indicated that four of the variables have a significant relationship with student's access to technology before joining university. The variables are v1, v2, v3, and v4 (See Appendix L). Thus, inference drawn from this finding is based on the four variables.

Table 4.29: Chi-square Test Result between did you have access to any form of technology and Perceived ease of use (PEOU)

		V1	V2	V3	V4	V5	V6
Did you have Access to any form of technology before joining the Univ.	Chi-Square Value	36.637	44.201	25.581	23.211	0.270	7.145
	Asymp Sig. Value(P-Value)	*0.00	*0.00	*0.00	*0.00	0.99	0.128

$*P<0.05$= significant Relationship

From the cross tabulation (see Appendix I), majority of the 322 participants who indicated that they have had access to technology before coming the university, 77% (285) indicated that their interaction with technology is clear and understandable, while 76% indicated they find technology easy to use. On the other hand, of the 48 participants who did not have access to technology prior to joining the university, less than 20% of them indicated that their interaction with technology is not clear and understandable, while 11 of them claimed they did not find technology easy to use. From the 322 participants who indicated to have had access prior to joining the university, majority of them (Appendix L) claimed that learning to operate computer is easy and that, they were capable of performing learning tasks on computers. However, a reasonable percentage of the percentage of the participants who never had access to any form of technology indicated that learning to operate computer is not easy and that they were not capable of performing learning tasks. it can therefore be implied that, students who have had access to some forms of technology before joining the university are likely to be more competent in the use of technology for learning purposes than those who only have access to technology when they join the university.

4.7 Challenges Students Face with the Use of Technology for Learning Purpose

Participants were asked question relating to the challenges they face with the use of technology for learning purposes. Of the 370 participants who participated in the study 81.4% (Fig- 4.9A) indicated they did not find it difficult to navigate the Internet, while 18.6% of the participants find it difficult to navigate the Internet. 66.8% (Fig - 4.9B) were competent with the use of computer application programs while 33.2% of the participants indicated they find it difficult to use computer programs. A higher percentage 81.6% (Fig - 4.9C) of the respondents were able to do online- task on computers while 18.4% of the participants were unable to do learning task on computer due to unfamiliarity with technology. Similarly, a reasonable percentage 82.4% (Fig - 4.9D) of the participants were capable of downloading informative materials for learning purposes while 17.6% were unable to do so. In addition, majority of the respondents 86.2% (Fig - 4.9E) were able to do online self -studies while few percentages were unable to do online self-studies. Furthermore, a higher percentage 92.8% of the respondents were able to use parts of computer such as function keys, while few percentages 7.8% indicated they cannot use parts of computer.

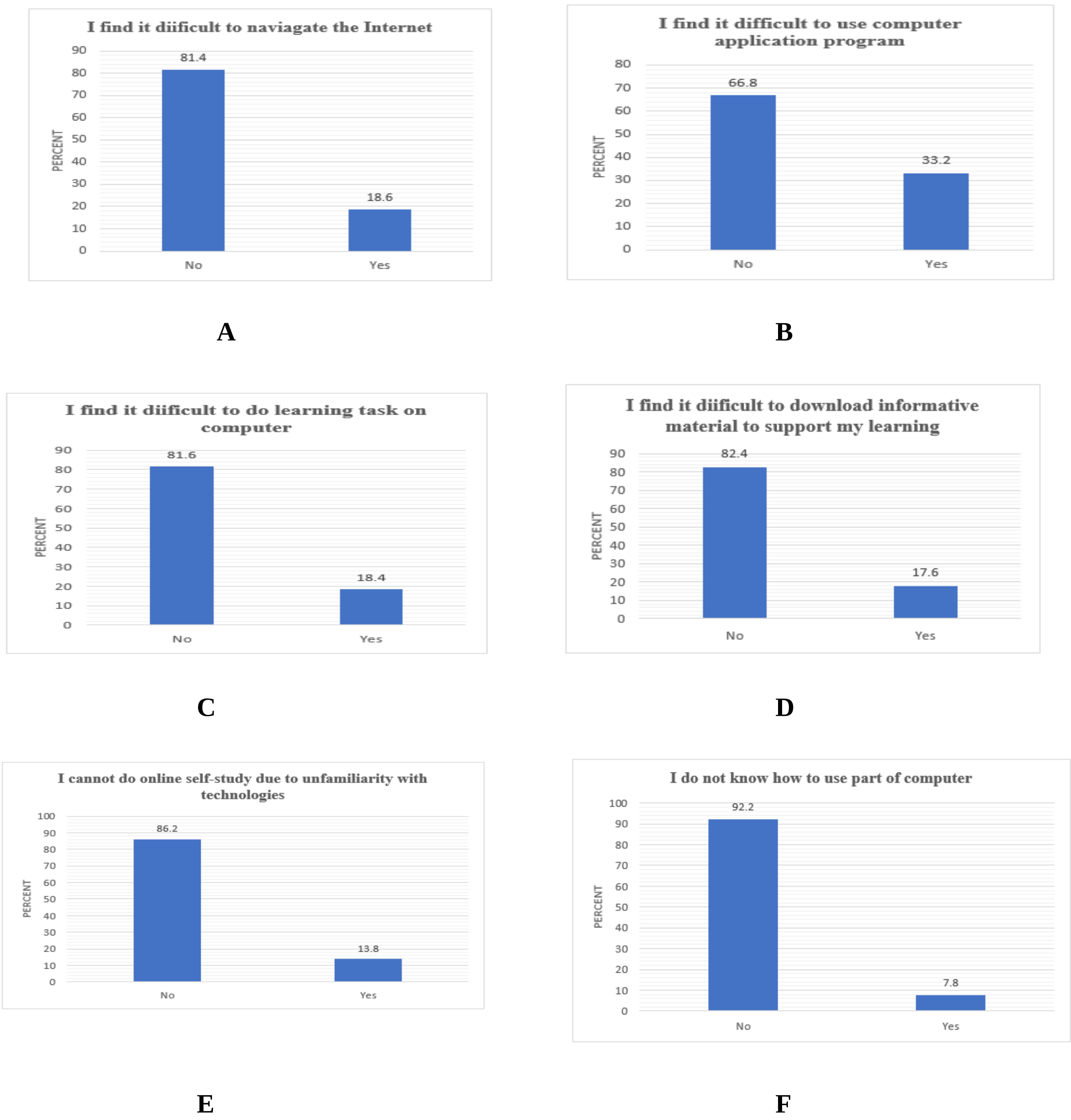

***Figure 4.9*: Information about challenges students face with the use of technology for learning**

4.8 Open ended questions

In the questionnaires, respondents were provided with spaces to indicate and elaborate their challenges as well as suggestions they may have regarding their use of technology for learning purposes. Out of the 370 student participants, 167 students responded to the open-ended questions. For the challenges experienced while using technology, the responses obtained were summarized into themes. The themes are listed as follows;

Theme 1: Unfamiliarity with technology

- This theme focused on the inability to use computer parts such as mouse, keyboard.

Theme 2: Lack of basic IT skills

- The skills that this theme focused on was the student's inability to browse the Internet, perform online tasks (such as downloading useful learning materials) and their inability to use MS Word and Excel spreadsheets for their school work.

Theme 3: Lack of facilitating conditions

- The relating conditions were lack of technical support in the LANs and classrooms, insufficient resources and distractions such as fellow students that make noise, eat in the LANs and smoking by the entrance of LANs.

The themes for the suggestions made are listed as follows;

Theme 1: Availability of facilitating conditions

- This theme included the availability of technical support in LANs and classrooms (technical assistants), sufficient computers and photocopy machines, conducive environment for learning and studying that is free of distractions such as smoking, eating, and noise from YouTube.

Theme 2: IT course should be made compulsory for all first-year students

- The suggestions touched on the compulsory IT modules that focus on using technologies and other software applications for learning purposes.

Theme 3: Training and orientation

- The theme included introduction of practical training on the use of technological resources and beginning of the year orientation programs.

In the responses relating to the challenges experienced with the use of technology (fig:4.9A), 57% of the responses related to a lack of basic computer skills, 33% of the responses referred to lack of facilitating conditions while the remaining 10% of the responses were based on unfamiliarity with technology. Moreover, regarding the responses relating to suggestions, (fig: 4.9B) 50% of the responses were around implementing facilitating conditions in the LANs and 36% of the responses were about training and orientation programs for the students. Furthermore, about 14% of the respondents suggested that IT modules should be made compulsory for first year students regardless of students' disciplines.

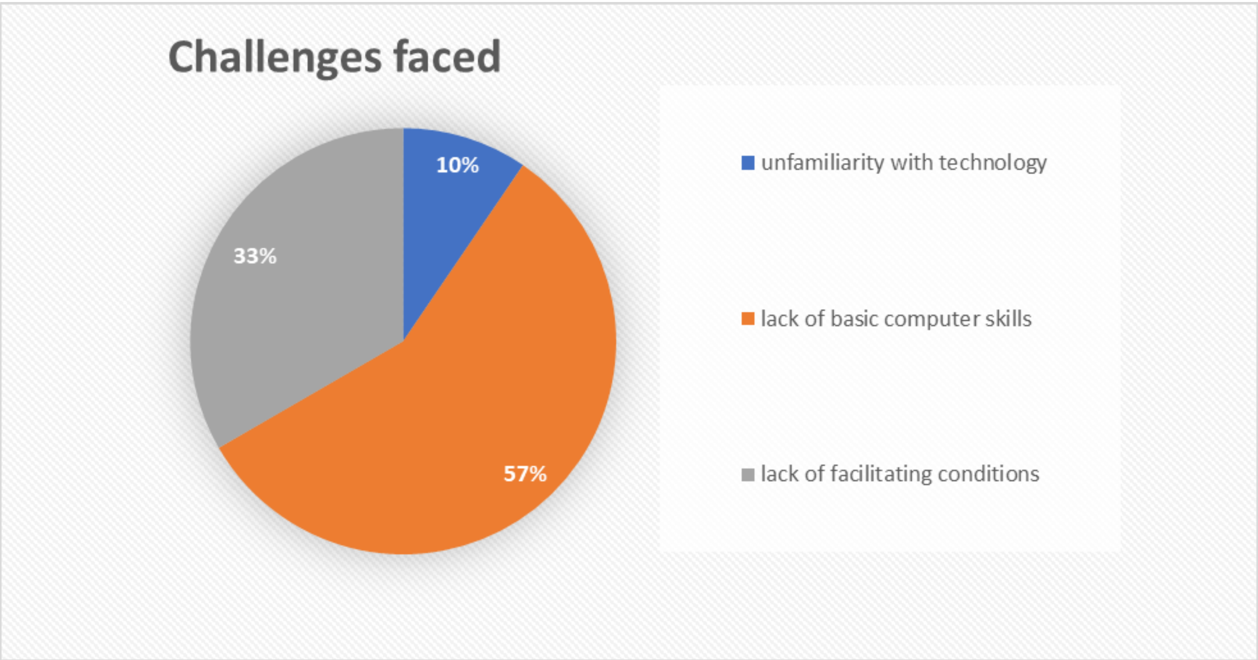

Fig 4.9A Challenges student face while using technologies (open ended question)

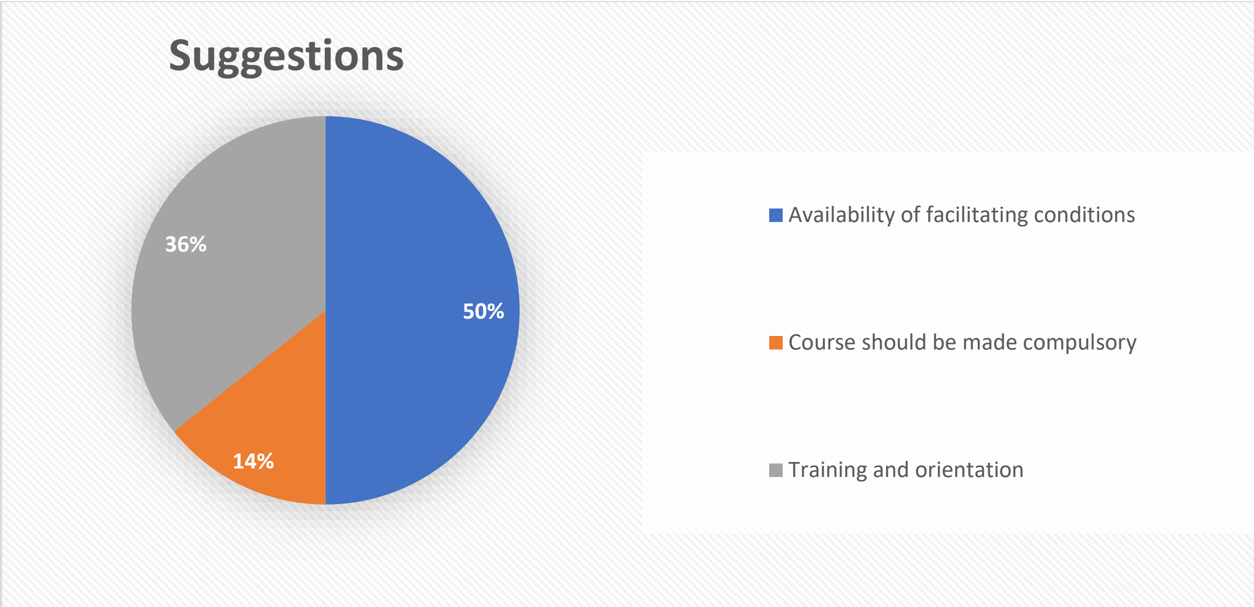

Fig: 4.9B Suggestions from students based on the challenges they face while using Technology (open-ended question)

4.9 Conclusion

This chapter presented the responses of the participants. In total a 98% response rate was obtained. The data for the study were non- normally distributed, hence non-parametric test such Chi-Square was conducted on the data. In addition, descriptive statistics in form tables was presented while cross tabulations were used to derive inferences. Similarly, inferences derived from each cross tabulation are provided at the end of the sections. The next chapter (Chapter 5) discusses this result in view of the research objectives.

CHAPTER 5: DISCUSSION OF RESULTS

5.1 Introduction

In the previous chapter, the analysis of responses, including the inferential and descriptive statistics obtained from the analysis of the gathered data was presented. In this chapter, the discussion of the analysis, with respect to the research objectives and questions of this study is presented. This chapter also shows how the objectives of this study has been achieved, in relation to the literature. In addition, the meanings and implications of the analysis results in relation to the objectives of this study are also presented in this chapter.

5.2 Research objectives

As presented in chapter 1, the following are the objectives of this study:

1. To understand the factors that affects student's computer self-efficacy (or lack-off), prior to joining the university.
2. To identify the challenges faced by first year students in the use of technology for learning.
3. To propose ways in which the challenges of digital divide can be managed, especially among first year students.

The alignment of the findings in this study, in relation to the objectives of the study are discussed below.

5.2.1 Research Objective 1: Understanding the Factors affecting students' computer self-efficacy

In order to understand and manage the challenges of digital divide among first year students, this study set to first understand the factors affecting students' computer self-efficacy. This is because it has been identified in the literature that computer self-efficacy of students is also a contributing factor to digital divide (Compeau, Gravill, Haggerty, & Kelley, 2015). According to Deng, Doll, and Truong (2004); Compeau et al. (2015), computer self-efficacy refers to the judgment of an individual's capability to use computers to perform tasks. It is a crucial factor that determines the outcome an individual expects after using computers to perform tasks. High computer self-efficacy brings about high competency level with computer usage (Deng et al., 2004; Jegede, 2007; Compeau et al., 2015). Hence, individuals who do not consider themselves as competent computer users often suffer from low computer self-efficacy, and they in most cases, where and when they can, often avoid computer usage.

Factors affecting Students' Computer self-efficacy

To achieve the first objective of this study, which is to understand the factors that affects student's computer self-efficacy (or lack-off), respondents were asked questions relating to ownership and access to technology as well as technology skills. The ownership and access to technology, just like technology skills, were identified in the literature as key factors that affect students' computer self-efficacy. Hence, they were key consideration in this study.

- **Time of ownership and access to Technology as a factor affecting Students' Computer self-efficacy**

The participants in this study were asked questions relating to technology ownership and access. The most important questions posed were those relating to technology ownership and access which was acquired prior to joining the university. From the analysis of the responses, 87% of the respondents indicated they had access to technology before joining the university, while 72.7% of respondents indicated that they owned technologies before joining the university. Almost half of the respondents, 51%, who indicated that they did not own computers before joining university further specified that they are not competent with using computers for learning purposes. Likewise, 50% of respondents who indicated that they did not have access to technology before joining the university noted that they are competent with using computer for learning purposes. Majority of these respondents also indicated that having access to computers after joining the university has improved their computer self-efficacy. Further finding showed that from the total number of the respondents (172) who indicated that they had access to computers before joining the university, the majority (96%) of them demonstrated a high competency level with the use of computers for several learning tasks requiring the use of technology. Out of the total number of respondents (194) who indicated that they did not own a computer before joining the university, 51% of them indicated that they are competent with computer usage for learning purposes. In addition, a higher percentage (Appendix E) of the respondents who had access to some form of technologies before coming to the university indicated that learning to operate a computer is easy and that they find technology easy to use

The findings show that students' prior access and ownership to technology has an impact towards the ability to use technology for learning purposes. To bridge the gap, university's technology facilities are considered to assist towards bridging the gap of prior ownership and access. For instance, the UKZN policy that first year students require laptops is considered a method of fast-tracking students that have had no prior technology access or ownership. Also, the research findings showed that after obtaining computers and access to technology improves the students' ability to use technology for learning purposes. This can be attributed to the study of Mashile (2016), which explained that the effort of institutions in bridging access and skills gap among students, is aiding towards reducing the consequence of digital divide and its impact on students learning. It can therefore be presumed that the time of access and ownership to affects the student's technology capability and in-turn affects students' computer self-efficacy.

Technology Skills as a factor affecting computer self-efficacy.

Most of the respondents who indicated that they did not have access to computers noted that learning to use a computer is challenging and that their interaction with computers takes time and effort to fully understand how computers operate. This implies that students who have not gained prior technology skills before joining the university require additional effort to familiarise themselves with using computers. It is believed that the lack of skills is as a result of no prior access to computers. The findings also revealed that students who had no technology skills gain self-efficacy after they had entered the university. This is because universities require students to compile assessments and to conduct online tasks via computers. Therefore, using a computer becomes compulsory regardless of whether you have not had prior access to technology before entering the university. From this result, it can be implied that students who have had access to computer before joining the university are likely to be more competent in its usage than those who did not or have only gained computer access after joining the university. This is because students who have had prior access to computers have developed the necessary skills and confidence to use technologies (Castaño-Muñoz, 2010; Meyers et al., 2013; Ghobadi & Ghobadi, 2015).

A chi-square test was conducted between "computer ownership", "computer accessibility" and "performing computer-related task" variables. The result of the test showed that there is a significant relationship, $p< 0.05$, between computer ownership, accessibility and the level of competency in the use of computer. A cross-tabulation between two variables, namely "access to any form of technologies before coming university" and "level of competency with the use of computer" conducted. The cross-tabulation shows that there is a significant relationship (Appendix L) between students' access to technology before joining the university and computer skills. Therefore, it can further be implied that students who have had access to some forms of technology before joining the university are at an advantage towards the use of computers. Similarly, it can be implied that prior exposure to computer before joining the university enhances learners' confidence and skills in computer usage. This suggests that, students' lack or insufficient access to technological resources before joining the university often affects their computer self-efficacy (Jegede, 2007; Naidoo, 2011; Berrío-Zapata, 2014; Compeau et al., 2015).

However, findings from this study also showed that majority of the respondents, 62%, can browse the Internet easily even though they did not have access to the Internet before joining the university. This could be attributed to the Internet provision provided by the university. The Internet access has allowed students to use their smartphones for Internet, given that majority of the students had some form of access to smartphones yet limited or no Internet connection prior to joining the university (Montague & JieXu, 2012). The students' ability of using their smartphones transpires on laptop and computer usage which makes browsing the Internet less challenging. Although such access might not have influenced their Internet browsing skills, it is expected to enhance their downloading and online navigation skills.

The higher competency level with Internet usage for learning purposes noted by respondents (92.4%) who had access to the Internet before joining university supports the studies by Hassani (2006); A. Van Deursen and Van Dijk (2011). Their study highlighted that student who have had access to the Internet before joining university are likely to possess web surfing skills than those who did not. According to Compeau et al. (2015), access to the Internet before joining the university brings about strong affinity and confidence for students, which in-turn leads to high competency in Internet usage for learning tasks. In addition, the chi-square result between "previous Internet access" and "performing Internet related tasks for learning purposes" showed a significant relationship between the two variables. It can be implied that access to the Internet prior joining the university influences learner's technology usage skills.

- **Computer anxiety as factor affecting computer self-efficacy**

A high percentage of the African students indicated that they do not know how to use computer peripherals such as mouse and keyboard. In another finding, a higher percentage of African students indicated that they encounter challenges when downloading material from online platforms. These findings can be associated with prior technology access disadvantages of the African students. In a similar digital divide research conducted, it was found that prior access or ownership of technology has an impact on students computer self-efficacy (Deng et al., 2004; Saadé & Kira, 2009; Compeau et al., 2015). These challenges encountered are considered as factors that lead to computer anxiety as other first year students get the opportunity to use a computer for the first time. As defined by Saadé and Kira (2009) computer anxiety refers to the feeling of being fearful while using a computer. Therefore, it becomes more of a challenge for African students to use computers as it is a technology that they are unfamiliar with. In affirmation, studies by Jegede (2007) and Compeau et al. (2015) showed that individuals with computer anxiety are likely to find it difficult to use computers. This is because such individuals will often avoid computer-related tasks due to fear, and this consequently may affect their usage skills. Deng et al. (2004) also found that computer anxiety is a crucial factor that affects students' computer self-efficacy. Therefore, based on the research findings, students are less likely to perform fruitfully while using computers, due to the fear of having an encounter with a computer for the first time. A suggestion proposed by Smith (2015) is to provide technological awareness and training in universities to enlighten and motivate students to familiarise themselves with technology in order to lessen the digital divide gap.

5.2.2 Challenges faced by first year students in the use of technology for learning

To achieve the objective of understanding challenges faced by students, respondents were provided with a list of possible challenges they might be facing or have faced while using technology. In the case where a respondent had not experienced any of the challenges listed, an open-ended section was provided in the questionnaire for respondents to write out the challenges they are facing or have previously encountered while using technology.

The findings of this study showed a high percentage of students who indicated that they experienced challenges with the use of technology for learning purposes. These were respondents who have had some or no access to technology before becoming university students. The challenges that the students' encounter include the use of application programs (e.g. MS Word, spreadsheet), downloading learning materials, conducting online tasks and navigating the Internet. Furthermore, the findings of this study also showed that irrespective of students' exposure levels to technology prior to joining the university, students are often faced with the university's specific technological challenges that often include insufficient technological resources (e.g. printers, computers, and scanners), power interruption, poor Internet connectivity and lack of technology assistants.

A chi-square test was conducted to ascertain whether a significant relationship exists between "time of access to technology", before or after joining the university, and "experiencing challenges when using technology for learning tasks". The chi-square results showed that there exists a significant relationship between time of access to technology and experiencing challenges while using technology. Thus, it can be implied that the challenges students experience is dependent on students' time of access to technology (i.e. before or after joining the university). Furthermore, it can be established that students who had been exposed to technology before coming to the university are less likely to experience challenges with using technology for learning task. These findings are supported by previous studies which showed that time of technology exposure plays a crucial part towards developing an individuals' technological skill (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Dornisch, 2013; Adhikari et al., 2016). This in turn decreases the usability challenges of using technology.

5.2.2.1 Challenges experienced by students

Apart from the challenges listed in the questionnaires, the questionnaire included a section for students to specify their challenges as a result of digital divide.

- **Difficulties with conducting learning tasks**

A high percentage of the respondents of this study indicated that they experience difficulties while performing technology-related learning tasks such as compiling assessments, downloading informative materials from the Internet and conducting online self-studies. These findings can be aligned to Moodle challenges encountered by students in universities. The findings imply that students are unable to use the online platforms to access the relevant material, which in turn hinders their academic performance. This is because students may end up not submitting within the due date as they are unable to adequately use the online learning platforms to conduct the required tasks. These findings can be said to align with the findings in the studies of Ramorola (2013); Mashile (2016) which showed that students experience difficulties with using technology and while carrying out learning activities. Dornisch (2013) in his study found that students' unfamiliarity with technology brings about challenges while conducting technology-related learning tasks. This is because if they are unfamiliar with technology, they are not likely to have developed the necessary skills and confidence to use technology.

Furthermore, the findings obtained from this study showed that 64% of students experience difficulties when using computer application programs (e.g. MS.Word, Spreadsheet

Applications). This challenge can be said to have originated from students' unfamiliarity with such applications and lack of adequate training on how to use such applications. The findings can also be associated with the norm that students mostly use technology for socialisation purposes. Students mainly use application programs when conducting assignments. The study findings support the study of Naidoo (2011) which showed that most students are incompetent with the use of application programs due to lack of effective training programs. In a study conducted by Hassani (2006); Osterman (2013) showed that users gain confidence and develop affinity towards the use of computer application programs for tasks, when they frequently use such programs. This often results into the users' high competency in the use of the programs. It can therefore be inferred that, students lack computer skills towards the use of computer application programs. This is also due to the lack of training that universities provide in assuring that students are conversant with using application programs for meaningful assignment outputs.

- **Lack of technical and administrative support**

In the open-ended sections of the questionnaire, students expressed their concern towards lack of technical support in the LANs. The students' lack of technical support is considered to stem from the challenges that students encounter in LANs when students are using computers and printers to conduct their assignments. For instance, some computers in LANs lose Internet connectivity and students are unable to ask for instant assistance which in turn leads to limited resources. Also, not all students are doing computer related qualifications which therefore suggests that not all students would be able to resolve minor technical errors in LANs. This aligns with the findings in the studies of Tinio (2002); Ramorola (2013) and Voogt, Erstad, Dede, and Mishra (2013) which indicated that majority of the institutions that have adopted technology-enabled learning rarely employ technical support teams for students.

Lack of administrative support is experienced by students when they need to print out their assignments, ensure that they have enough printing credits and are connected to the printing machines. The research findings indicated that students are encountering admin challenges due to no admin staff that are visible in LANs. For instance, a student responded by noting that, "*Printing in the LANs is a headache because the printers are too complex to use, and there is no assistant to help me*". In UKZN, admin assistance is only made available during computer practical sessions and after the practical sessions the demonstrators are dismissed. In support of the study findings, the study by Bingimlas (2009) showed that students face challenges when printers not printing, computers failing to connect to the Internet and malfunctioning of computers. This poses a challenge to students because the university often assumes that they are capable enough to use the technology resources based on their exposure however, students are not fully skilled and have no admin rights to technical appliances. For instance, in UKZN, printers are loaded with paper by admin or technical staff, during afterhours when students are working on their assignments and there is no paper in the printers, the students have no one to assist them with loading the printing machines.

- **Insufficient university resources**

The responses obtained from the respondents through open-ended questions show students recon that the university is providing insufficient technology resources. The insufficient resources mentioned by the respondents were namely printers, computers, Wi-Fi coverage and useful educational software's. As noted by the respondents in the open-ended question, two students indicated that, "*I cannot do my work wherever I want except I go to the library and LAN".* This affirms the notion that Wi-Fi coverage is an issue within the university. These findings support the study of Bingimlas (2009); Voogt et al. (2013) which showed that in most cases, academic institutions lack adequate resources. Similarly, a study by T. Oyedemi and Mogano (2018) found that insufficient computers, printers and peripherals are challenges for students when undertaking learning tasks. This poses as a challenge for students as they are unable to use technology resources as and when they need to.

However, several factors contribute to insufficient technological resources. The research findings from the open-ended responses consisted of some students that noted that other students misuse the LAN computer for watching and engaging on non-academic activities. This implies that in as much as the university provisions for technology resources, other students misuse the resource which therefore impacts those students that need the resource for academic activities. It can also be assumed that the UKZN laptop policy is a measure to increase resources so that students do not have to highly depend on LANs. This is because LANs constitute of limited resources that cannot occupy the number of enrolled students. Similarly, in a study by Yazdanpanah, Eatemadololama, and Hessam (2018) it was found that the high number of registered students poses challenges on the students. This is because overpopulation occurs with the universities resources as students depend on the university facilities. Similarly, Voogt et al. (2013) found that poor organisational management and maintenance often brings about hardware breakdown which in-turn leads to insufficient resources. In addition, the lack of resources in UKZN may also be a result of poor maintenance of the technologies. As affirmed by Adikwu et al. (2017) found that lack of funding that promotes technology-enhanced learning, also possess as a major factor causing insufficient resources.

- **Insufficient IT training and orientation programs**

Findings from both close-ended and open-ended questions, showed the percentage findings of students that expressed their concern towards inadequate IT training and orientation programs. This supports one of the findings in the study by Hamiti et al. (2014) which revealed that one of the major barriers to technology-enhanced learning is inadequate training opportunities for students. This is also seen within UKZN as students are not provided any form of training to tools that they will be using to conduct learning tasks. For instance, in UKZN students are expected to do online tests on the Moodle platform yet no training is provided. It is often assumed that students are familiar with using any form of tool. This implies that students are unable to capitalise on the technological resources due to the lack of knowledge about the resource capability. A study by T. D. Oyedemi (2012), consisted of students who were asked to indicate their competency level with the use of spreadsheet and word-processing application programs. Observations showed that a high percentage of the students demonstrated low competency levels with the use of such programs, and these students indicated that their inability to use the applications stems from a lack of sufficient training and orientation programs. Also, in UKZN, students from various disciplines have the option of electing ISTN 100 as an elective that assists them in familiarising themselves with the basics of computers.

However, there are no serious measures that are taken if students do not attend the practical sessions which means that the purpose of the practical trainings are not being fully met. Similarly, Voogt et al. (2018) found that some of the students only know how to set up printers and boot up a computer which signifies that students lack computer usage skills. This indicates that students do not have much interest towards the practical aspects of computer lessons as this is also seen across other ISTN modules. This could be the result of lack of orientation enforcements that introduce the students to the universities compulsory learning tool, Moodle, that can improve their academic engagement and outcomes. It could also be that majority of the students believe that their IT skills and confidence are enough to satisfy their IT needs, due to prior access to some forms of technology at home or high school before joining the university. Similarly, Compeau et al. (2015) indicated that students' lack of interest in trainings poses challenges for students when they are required to carry out certain learning tasks with technology.

- **Lack of enforcing the technology policy**

Responses obtained from this study showed students assumed that there are no policies guiding the use of technological resources for learning purposes. This raises a concern as technology has become an integral part of teaching and learning activities. Njenga and Fourie (2010); Liberman (2015) in their study, found that majority of students utilise technological resources for personal activities, mainly for social media and gaming, when they are in LANs and libraries. As a result, other students who are solely doing learning tasks are likely to be distracted. The findings confirm the research findings as students misuse the technological resources in LANs which has made students to assume that no policy that governs technology usage exists. For instance, one of the respondents in this study wrote "*the only time I get to do my work is at night, but you find other students in the LANs playing music and watching wrestling*". Similarly, Hinostroza (2018) explained that, due to lack of a strong policy that regulates the use of technology in academic institutions, students abuse technology and they end up using technology for a number of personal tasks, such as gaming, chatting and pornography. This poses challenges for other students as they are likely to be distracted while studying.

- **Power interruption**

Based on the findings from this study, another challenge students' experience when using technology is power interruption. This is because all the technological resources require electricity for their functionality. The results of this study, as also obtained in the studies by Ndume, Tilya, and Twaakyondo (2008); Qureshi, Ilyas, Yasmin, and Whitty (2012); Liberman (2015) showed that power outage is a challenge students when using technology. Although, the power outage may be short-term and may occur occasionally, it disrupts the teaching and learning activities whenever it happens. A study by Bingimlas (2009) showed that some institutions do not have power-backup systems, as a result, teaching and learning activities are suspended whenever there is power interruption. Similarly, Ramorola (2013) stated that during power outage, students would most likely experience difficulties with losing their work as they would not have been constantly saving the work.

5.2.3 Possible Means to Manage the Digital Divide Challenges

It is no doubt that IT has changed today's teaching and learning approach through its interactive and dynamic nature. Most teaching and learning activities are now being facilitated by various technological approaches, thereby creating challenges for students who lack technological skills to capitalise on the available resources. In this study, students highlighted the challenges and also made suggestions for the identified challenges. The following suggestions reflect the suggestions that students noted in the open-ended section as well as the proposed suggestions that students selected from the questions in the questionnaire.

The following are the possible means to alleviate these challenges;

- **Suggestion to the difficulties experienced when conducting online learning**

In this study, students indicated that they experience challenges with doing several technology-related learning tasks. Several factors result into these challenges for students when conducting learning tasks that involve technology. To manage the challenges identified by respondents in this study, it is recommended that institutions introduce IT trainings and awareness programmes, at the beginning of the year that focus on how to use technology for learning purposes. The trainings should include how to use word processing software, perform web surfing, use spreadsheet software, use Endnote software and carry out basic computer task. This may help equip students with necessary skills to perform their learning tasks effectively (T. Oyedemi & Mogano, 2018).

In a study conducted by Voogt et al. (2013) showed that universities may also provide constant support in form of designated technology mentors in libraries, classrooms and LANs to be available for students enquiries. The assistants may be responsible for issues relating to technology resources and also assist students who encounter any form of difficulties while using technological resources. However, according to Dornisch (2013), students require full technical support especially in the early stage of a new technology adoption. In addition, institutions may setup a team that will focus on continuous monitoring of whether students are coping with technology or not. This team may also evaluate the available resources on monthly basis to identify the possible or required maintenance. Furthermore, technology training materials or a manual for a specific resource can also be made available for students.

- **Suggestion to lack of technical and administrative support**

Based on the findings from this study, it is evident that students experience difficulties while carrying out learning activities due to lack of support. According to Johnston (2017), the lack of technical support often occurs as a result of lack of funding, lack of policy and lack of institution culture. However, for financial assistance, Bingimlas (2009) and Johnston (2017) posited that South African institutions may request for funds from the Department of Education. This may enable institutions to employ full-time competent technicians that would be responsible for the technical demands of students when using technology. Furthermore, the availability of administrative and technical support, within the university campus and residences, may influence students' frequent use of technology. This in-turn enhances their usage skills and further bridges the skill gaps. With adequate technological support, it is believed that institutions are likely to overcome the issue of digital divide (especially digital capability divide) among students.

- **Suggestion to insufficient resources**

Responses obtained from the respondents showed that universities do not have enough resources such as printers, computers. The findings further reveal the technology challenges that contribute towards insufficient resources in universities. For instance, lack of IT support in universities LANs results in decreased resources as students are not equipped to fix minor technical issues they encounter. However, the shortage of resources could also be a result of lack of funding from the government as well as poor maintenance and lack of technical support. In a manner to try and provide enough resources, the SA department of education encourages institutions to request for funding from public and private organisations to acquire the necessary resources. It is recommended that universities also consider creating funding events that assist with purchasing and maintaining technology resources instead of waiting for the government to provide finances. Furthermore, institutions may also employ full-time technicians to perform regular maintenance and fix technical problems to ensure that the resources are fully functional. This in-turn will prevent hardware breakdown and further decrease the possibility of insufficient resources.

- **Suggestion to lack of adequate training and orientation programs**

Respondents of this study highlighted lack of effective training as one of the barriers to effectively use technological resources. Consequently, students struggle while carrying out technology-related tasks. However, it is believed that for students to be able to use technology effectively, the teachers need to be trained to equip students with adequate skills. This in-turn would enable students to meet the demands of the available resources and to use it effectively for learning purposes. The results of the study by Colak, Karaduman, and Yurdakul (2018) showed that institutions lack qualified teachers in technology-integrated learning. As a result, students face difficulties while carrying out certain learning task with technology. It is therefore fundamental to provide students with compulsory training that focuses on technology integration into learning activities rather in conjunction with the orientation programs that only focus on introducing students to the university lecture venues. The training and workshops should be for both students that had prior access and no prior access to technology. This is because having prior access to technology does not assure that students are familiar with the learning tool that the university expects students to use for learning purposes.

- **Enforcement of the technology policies**

Findings from this study showed that there's no enforcement of the policy that regulates the use of technological resources. Therefore, this indicates that students do not know what is acceptable whenever they are required to use technological resources. This raises a concern because technology has become a crucial part of teaching and learning activities. Respondents in this study highlighted several leisure activities performed by other students which often causes distractions for others while doing learning tasks in the LANs and libraries. These activities are smoking by the LAN entrances, gaming, watching soccer and YouTube. However, as a recommendation, institutions should constantly assure that students abide by the policy. In most cases the policy exists yet there is no monitoring of whether the policy is being implemented by the students. Likewise, institutions may designate a task team to monitor the students' usage of the technological resources in the LANs and libraries to ensure that students are using the resources for learning purposes.

- **Suggestion to power interruption**

Power interruptions in universities have a major impact on the technologies that are electricity dependent. Also, power interruptions negatively impact the learning process because some learning tasks are conducted using resources such as computers and Wi-Fi. In the studies conducted by Akaninwor (2018), it was evident that electricity is a facilitator of technologies such as computers and the Internet. Therefore, universities need to consider power outage remediation that will assist in incidences of power disruptions. However, not all universities are in areas that support renewable energy such as solar and bioenergy. According to Fatunde (2016), universities consist of senior scholars who are knowledgeable in agriculture, engineering and computer sciences. Therefore, a mandate may be given to construct energy plants that can generate sufficient power supply in cases of power outages. Alternatively, government could intervene in the power outage occurrences by providing private power supply systems for academic institutions. Also, power backup generators for educational institutions can be purchased so that no disruptions are encountered, and for tasks to continue as scheduled.

5.3 Conclusion

This chapter discussed the findings in light of the research objectives. In addition, it presented how the research objectives have been achieved through the analysis of the data. According to the findings of this study, it was established that time of access, ownership to technology (prior to or after joining the university), technology skills, and computer anxiety affects the student's computer self-efficacy. The results also showed that students with little or no exposure to technology prior to joining the university often face challenges namely use of application programs (e.g. MS. Word, Spreadsheet), downloading of informative materials, conducting online tasks and navigating the Internet. However, the study's findings, also showed that irrespective of student's exposure level to technology prior to joining the university, students are often faced with the university's technological challenges that often include insufficient technological resources (e.g. printer, computers, scanners), power interruption, poor Wi-Fi connectivity and lack of technology assistants. Furthermore, the chapter presented possible means by which the challenges can be managed.

CHAPTER 6: CONCLUSION

6.1 Introduction

In the previous chapter, the findings of the study were discussed in relation to the research objectives. It also presented how the research objectives have been achieved through the analysis of the data. This chapter concludes and summarises the results of this study with emphasis on the major findings. In addition, it provides suggestions and recommendations for future research.

6.2 Overview of the dissertation.

This main objective for this study was to identify the challenges of digital divide among first year student and to also identify possible means through which the challenges can be alleviated. As a result, the following main research questions were used to achieve the objective of the study.

1. What factors affect students' computer self-efficacy (or lack-off), prior to joining the university.
2. What are the challenges faced by first year students in the use of technology for learning?

This thesis consists of six chapters (this chapter inclusive). A summary of each chapter is presented below:

In chapter 1, the study was introduced by providing an overview on digital divide, problem statement, research questions, objectives, and the theoretical frameworks used in the study. The chapter also presented how digital divide emerged. In addition, the chapter presented how digital divide has compelled the need for technological skills among students in educational systems. Furthermore, overview of the thesis's chapter and limitation to the study were also provided.

Chapter 2 presented a review of the literature on digital divide. It presented how digital divide in the South African context has been in existence since the apartheid era. In addition, the chapter also highlighted the factors influencing digital divide, as well as the integration of technology into educational systems. Furthermore, the chapter presented the literature on digital literacy and the relationships between technology and students' academic performance.

Chapter 3 discussed the research methodology and techniques that were employed in this study. In the chapter, the conceptual frameworks used for the study was discussed. A stratified probability sampling technique was used, 370 questionnaires were distributed, and the responses were captured, analysed using statistical package for social science (SPSS).

Chapter 4 provided the analysis of the collected data as well as the descriptive statistics obtained from the dataset. Before the presentation of the analysis, the chapter presented the results obtained from the various tests conducted on the data. The result obtained from the normality test showed that the data for this study was not normally distributed. Therefore, non-parametric tests were performed on the data. Furthermore, cross tabulations and chi-square tests were used to determine the relationships between the tested variables in the study.

Chapter 5 discussed the findings with regards to the research objectives.

6.3 Conclusion of the study

This study focused on identifying the challenges of digital divide among first year student's and to also identify possible means through which the challenges can be alleviated. A combination of digital divide framework and Technology Acceptance Model (TAM) were used to guide the study. The constructs of the frameworks contributed towards the development of the research objectives and research questions. The first research question focused on investigating the factors affecting student's computer self-efficacy, while the second research question concentrates on identifying the challenges faced by student in the use of technology for learning. The third research question focused on the possible means through which digital divide challenges among student can be alleviated.

A quantitative research approach was employed for this study; therefore, 370 questionnaires were given out student at UKZN, PMB Campus. The data gathered was analysed through statistical package for social sciences (SPSS). With regards to the findings obtained, it was established that time of access / ownership to technology (before or after joining the university), technology skills, and computer anxiety affects student's computer self-efficacy. The results also showed that students with little or no exposure to technology prior to joining the university often face challenges that include use of application programs (e.g. MS Word, Spreadsheet), downloading of informative materials, conducting online tasks and navigating the Internet. However, the findings of the study also showed that irrespective of student's exposure level to technology prior to joining the university, students are often faced with the university's technological challenges that often include insufficient technological resources (e.g. Printer, computers, scanners), power interruption, poor Wi-Fi connectivity and lack of technology assistants. Possible means by which the challenges can be managed were presented in the preceding chapter.

6.4 Recommendations

In support of the literature, this study shows that digital divide exists among students in academic institutions. It is no doubt that technology is constantly evolving, consequently changing teaching and learning approaches in academic institutions. It is also creating a gap between students who have the skills to use the technological resources for learning purposes and those who do not.

For academic institutions to be able to address the challenges of digital divide, the following recommendations are suggested, (based on the findings obtained from this study):

- Academic intuitions should partner with private or public organizations to offer standard ICT training opportunities for students. The findings of this study showed that academic institutions are often perceived as the remedy to combat any form of social inequity. However, in few cases, they (i.e. academic institutions) might need additional resources to reach this goal.
- Academic institutions must introduce beginning of semester orientation programs for student, such programs should focus on the effective use of technology for learning purpose.
- Institutions should enforce policies that regulates the use of technology by the students. The policy should be aimed at curbing the misuse of technology and encouraging the use of technology for academic purposes.
- Institutions should invest in professional qualifications that focuses on integrating technology into teaching and learning, for the teachers. This is considered imperative as recent studies have shown that professional trainings for teachers is essential for the successful integration of technology into learning. In addition, investing in professional trainings for the teachers will in-turn assist in the development of students with the necessary skills to partake in the digital world.
- Sufficient technological resources must be provided by the department of education to institutions. Alternatively, institutions may develop a financing plan that entails measures to obtain technological needs for teaching and learning purposes.

- Institutions must employ full time technical support staffs, who will be expected to handle maintenance and technical issues on a regular basis. Such staff are also expected to provide support for students when they are using technological resources for academic purpose.
- On a regular basis, institutions must conduct assessment of all ICT resources. This would help to identify the difficulties students often face while using such resources.

6.5 Future Research

The constant evolution of technology brings new approaches to teaching and learning systems. This in turn creates digital divide gaps since technology constantly becomes outdated. It is recommended that future research in the area of digital divide should take into consideration the data collection from stakeholders and not only from students' perspective. Also, a qualitative approach to data collection should also be considered in future studies, especially with regards to collecting data from stakeholders such as management staff and lecturers. In addition, this study did not investigate the impact of digital divide on students' use of Moodle. Future research is suggested to understand the impact of digital divide on students' use of Learning Management Systems (LMS).

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APPENDICES

APPENDIX A: ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL™
INYUVESI YAKWAZULU-NATALI

22 May 2018

Mr Samuel Temitayo Faloye (216046532)
School of Management, IT and Governance
Pietermaritzburg Campus

Dear Mr Faloye

Protocol reference number: HSS/0456/018M
Project Title: Managing the challenges of digital divide among first year students: A case of UKZN

Full Approval – Expedited Application

In response to your application received 16 May 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

....

Dr Shamila Naidoo (Deputy Chair)
Humanities & Social Scinces Research Ethics Committee

/pm

cc Supervisor: Mr Nurudeen Ajayi & Mr Rushil Raghavjee
cc. Academic Leader Research: Prof B McArthur
cc. School Administrator: Ms D Cunynghame

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
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Website: www.ukzn.ac.za

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APPENDIX B: QUESTIONNAIRE

Managing the challenges of digital divide among first year students: A Case of UKZN

Researcher: Tayo Faloye
Supervisors: Dr. Nurudeen Ajayi
Mr Rushil Raghavjee

Discipline of Information Systems & Technology
College of Law and Management Studies
University of KwaZulu-Natal

- Please take your time to complete this questionnaire
- Please kindly take note of the instructions before answering any question(s).
- Please note that there are no right or wrong answers
- Please note that you are free to withdraw your participation from this study, should you wish to do so
- Kindly sign the letter of informed consent, giving me the permission to use your responses for this study

GENERAL INSTRUCTION: In all the sections, please put a tick (✓) to the option that applies to you

Section A: Demographic Information

1.	**Gender**	☐ Male	☐ Female			
2.	**Age**	☐ 17 and below	☐ 18 - 21	☐ 22 - 25	☐ 26 and above	
3.	**Race**	☐ African	☐ White	☐ Indian	☐ Coloured	Other:

Section B: Technology Ownership
NB: Please indicate your response by ticking (✓) the appropriate box

QUESTION: Which of the following do you own?

	Prior to coming to university	Only after joining the university	Do not own
Computer	☐	☐	☐
Laptop	☐	☐	☐
Smartphone	☐	☐	☐
Tablet/iPad	☐	☐	☐
Internet	☐	☐	☐
Game console	☐	☐	☐
Other (specify)			

Section C: Technology Access
NB: Please indicate your response by ticking (✓) the appropriate box.

QUESTION: Which of the following do you have access to?

	Prior to coming university	Only after joining university	Do not have access to
Computer	☐	☐	☐
Laptop	☐	☐	☐
Smartphone	☐	☐	☐
Tablet/iPad	☐	☐	☐
Internet	☐	☐	☐
Game console	☐	☐	☐
Other (specify)			

Section D: Information about Technology Skills
NB: Please indicate your response to each statement by ticking (✓) the appropriate box that applies to you.

QUESTION: How competent are you with the following technologies?

I am competent in using:		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Desktop computer					
2	Laptop					
3	Smartphones					
4	Tablet/iPad					
5	Kindle					
6	I can browse the Internet without help					
7	I feel comfortable using technologies for learning purposes					

Section E: Information about performance

NB: Please indicate your response to each statement by ticking (✓) the appropriate box that applies to you.

QUESTION: In what way(s) has access to technology affect your performance.

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1	Having access to technology before coming to university has not impacted my current performance					
2	Not having access to technology before coming to school has not impacted my current performance					

Section F: Perceived usefulness

NB: Kindly indicate your response to each statement by ticking (✓) the appropriate box that applies to you.

QUESTION: In what way(s) does perceive usefulness of technology affect your learning

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1	I do find technology useful					
2	Using technology makes me accomplish my learning tasks quicker					
3	Having access to technology has enhanced my academic performance					

Section G: Perceived ease of use

NB: Please indicate your response to each statement by ticking (✓) the appropriate box that applies to you.

QUESTION: In what way(s) does perceive ease of use of technology affect your learning?

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1	My interaction with technology is clear and understandable					
2	I find technology easy to use					
3	Learning to operate computers is easy for me					
4	I find it easier to download learning materials					
5	I find it easier to study online					
6	I find it easier to do my assignments on computers					

Section H: Challenges student face with the use of technology for learning

NB: Please indicate your option by ticking (✓) the appropriate box that applies to you.

***You may select more than one option.**

QUESTION: In what way(s) does the lack of access to Technology impact your learning?

	Challenges with the use of technology for learning	✓
1	I find it difficult to navigate (move around) on the Internet	
2	I find it difficult to use computer application programs e.g. Microsoft office, spreadsheet	
3	I find it difficult to do my learning tasks on computers due to my unfamiliarity with technology	
4	I find it difficult to download informative materials to support my learning	
5	I cannot do online self-studies due to my unfamiliarity with technologies	
6	I do not know how to use parts of the computer e.g. mouse, keyboard, function keys	

Name any other challenges:

____

____

____

Section I: Managing the challenges related to the use of technology
NB: Please indicate your option by ticking (✓) the appropriate box that applies to you.

QUESTION: In what ways should technologically disadvantaged students be assisted?
(those students with little or no previous access to Technology)

	Institutions should provide:	**(5) Strongly Agree**	**(4) Agree**	**(3) Neutral**	**(2) Disagree**	**(1) Strongly Disagree**
1	Beginning of the year technology orientation programs					
2	Constant support while using technology *(i.e.: In LANs and libraries)*					
3	Priority should be given to technology development programs					
4	Continuous monitoring on whether students are coping with using technology					
5	Technology training material should be made accessible *(i.e.: In LANs and libraries)*					
6	Establishment of technological support centers within the institution					
7	Technology assistants should by all times be available in LANs					

Name any other suggestions:

____
____
____

THANKS FOR YOUR TIME...

APPENDIX C - RELIABILITY TEST

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Gender	130.33	92.476	.023	.732
Age	129.94	91.804	.135	.729
Race	130.07	91.235	.029	.738
College	130.00	91.634	.035	.735
Laptop Ownership	130.34	93.862	-.110	.738
Smartphone Ownership	130.77	93.778	-.115	.736
Tablet/IPad Ownership	129.78	94.317	-.124	.745
Internet Ownership	130.55	93.335	-.066	.737
Computer Accessibility	130.41	94.097	-.129	.738
Laptop Accessibility	130.51	93.556	-.088	.736
Smartphone Accessibility	130.77	93.674	-.106	.735
Tablet/IPad Ownership	129.97	93.126	-.061	.741
Internet Accessibility	130.65	92.707	-.009	.733
Game Console	129.77	94.959	-.157	.747
I am competent in using Desktop Computer	127.91	83.710	.441	.711
I am competent in using Laptop	127.66	85.301	.439	.713
I am competent in Using smartphones	127.43	84.982	.457	.712
I am competent in using Tablet/IPad	128.07	86.459	.237	.725
I am competent in using kindle	128.87	85.126	.266	.723
I can browse the internet without Help	127.43	87.552	.283	.721
I feel comfortable using technologies for learning purposes	127.48	85.497	.414	.714
Having access to Any form of Technology before entering University	131.07	92.201	.095	.730
Having access to Technology before coming to University has improved my current study	127.50	87.686	.358	.719
Not having access to Technology before coming to the university has negatively affected my current study	128.19	93.503	-.094	.734

I do find technology Useful	127.33	87.099	.341	.719
Using Technology makes me accomplish my learning task quicker	127.43	86.466	.445	.715
Having Access to technology has enhanced my academic performance	127.59	85.321	.458	.713
My Interaction with technology is clear and Understandable	127.67	85.169	.508	.711
I find technology easy to use	127.70	84.305	.501	.710
Learning to operate computer is easy	127.92	83.356	.479	.709
I find it easy to download learning material	127.60	85.421	.425	.714
I find it easy to study online	127.94	84.626	.405	.714
I find it easy to do my assignment on computers	127.71	83.847	.471	.710
I find it difficult to navigate on the Internet	131.76	93.902	-.149	.735
I find it difficult to use computer application programs e.g MS Word	131.61	93.876	-.128	.736
I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology	131.76	93.794	-.135	.735
I find it difficult to download Informative materials online to support my learning	131.77	93.384	-.081	.734
I cannot do online -self-studies due to my unfamiliarity with technologies	131.81	92.987	-.026	.732
I do not know how to use parts of the computer e.g. keyboard, function keys	131.87	93.082	-.043	.732
Beginning of the year technology orientation programs	127.41	88.570	.270	.723
Constant supports while using technology(i.e. In LANs and Libraries)	127.58	87.035	.345	.719

Priority should be given to technology development programs	**127.67**	**86.725**	**.382**	**.717**
Continuous monitoring on whether students are coping with technology	**127.63**	**87.354**	**.328**	**.719**
Technology training material should be made accessible (i.e In LANs and Libraries)	**127.36**	**88.093**	**.382**	**.719**
Establishment of Technological support centers within the institution	**127.50**	**87.572**	**.348**	**.719**
Technology assistants should always be available in LANs and libraries	**127.41**	**86.894**	**.412**	**.716**

APPENDIX D- TESTS OF NORMALITY

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Computer Ownership	.342	370	.000	.691	370	.000
Laptop Ownership	.301	370	.000	.743	370	.000
Smartphone Ownership	.513	370	.000	.389	370	.000
Tablet/iPad Ownership	.357	370	.000	.670	370	.000
Internet Ownership	.442	370	.000	.592	370	.000
Game Console Ownership	.383	370	.000	.642	370	.000
Computer Accessibility	.340	370	.000	.725	370	.000
Laptop Accessibility	.377	370	.000	.674	370	.000
Smartphone Accessibility	.508	370	.000	.415	370	.000
Tablet/iPad Ownership	.321	370	.000	.681	370	.000
Internet Accessibility	.458	370	.000	.564	370	.000
Game Console	.370	370	.000	.651	370	.000
I am competent in using Desktop Computer	.234	370	.000	.819	370	.000
I am competent in using Laptop	.296	370	.000	.769	370	.000
I am competent in Using smartphones	.378	370	.000	.608	370	.000
I am competent in using Tablet/iPad	.233	370	.000	.830	370	.000
I am competent in using kindle	.192	370	.000	.899	370	.000
I can browse the internet without Help	.396	370	.000	.605	370	.000
I feel comfortable using technologies for learning purposes	.386	370	.000	.657	370	.000
Having access to Any form of Technology before entering University	.520	370	.000	.395	370	.000

Having access to Technology before coming to University has improved my current study	.291	370	.000	.753	370	.000
Not having access to Technology before coming to the university has negatively affected my current study	.454	370	.000	.403	370	.000
I do find technology Useful	.420	370	.000	.531	370	.000
Using Technology makes me accomplish my learning task quicker	.384	370	.000	.681	370	.000
Having Access to technology has enhanced my academic performance	.331	370	.000	.748	370	.000
My Interaction with technology is clear and Understnadble	.278	370	.000	.790	370	.000
I find technology easy to use	.272	370	.000	.781	370	.000
Learning to operate computer is easy	.241	370	.000	.833	370	.000
I find it easy to download learning material	.326	370	.000	.740	370	.000
I find it easy to study online	.231	370	.000	.839	370	.000
I find it easy to do my assignment on computers	.292	370	.000	.767	370	.000
I find it difficult to navigate on the Internet	.497	370	.000	.474	370	.000
I find it difficult to use computer application programs e.g MS Word	.427	370	.000	.594	370	.000

I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology	.498	370	.000	.471	370	.000
I find it difficult to download Informative materials online to support my learning	.502	370	.000	.461	370	.000
I cannot do nline self-studies due to my unfamiliarity with technologies	.517	370	.000	.408	370	.000
I do not know how to use parts of the computer e.g keyboard, function keys	.536	370	.000	.296	370	.000
Beginning of the year technology orientation programs	.380	370	.000	.648	370	.000
Constant supports while using technology(i.e In LANs and Libraries)	.319	370	.000	.742	370	.000
Priority should be given to technology development programs	.279	370	.000	.786	370	.000
Continuous monitoring on whether students are coping with technology	.303	370	.000	.770	370	.000
Technology training material should be made accessible (i.e In LANs and Libraries)	.391	370	.000	.660	370	.000
Establishment of Technological support centers within the institution	.344	370	.000	.719	370	.000

	Frequency	Percent	Valid Percent	Cumulative Percent
College of Agriculture, Engineering & Science	144	38.9	38.9	38.9
College of Humanities	102	27.6	27.6	66.5
College of Law and Management Studies	124	33.5	33.5	100.0
Total	370	100.0	100.0	

Technology assistants should always be available in LANs and libraries	.379	370	.000	.668	370	.000

a. Lilliefors Significance Correction

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	144	38.9	38.9	38.9
	Female	226	61.1	61.1	100.0
	Total	370	100.0	100.0	

DEMOGRAPHIC STATISTICS- APPENDIX E

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17 and Below	22	5.9	5.9	5.9
	18-21	326	88.1	88.1	94.1
	22-25	19	5.1	5.1	99.2
	26 and Above	3	.8	.8	100.0
	Total	370	100.0	100.0	

Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	African	208	56.2	56.2	56.2
	White	23	6.2	6.2	62.4
	Indian	117	31.6	31.6	94.1
	Colored	22	5.9	5.9	100.0
	Total	370	100.0	100.0	

INFORMATION ABOUT TECHNOLOGY ACCESSIBILITY – APPENDIX F

COMPUTER ACCESSIBILITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	198	53.5	53.5	53.5
	Only after joining the university	148	40.0	40.0	93.5
	Do not have access to	24	6.5	6.5	100.0
	Total	370	100.0	100.0	

LAPTOP ACCESSIBILITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	217	58.6	58.6	58.6
	Only after joining the university	145	39.2	39.2	97.8
	Do not have access to	8	2.2	2.2	100.0
	Total	370	100.0	100.0	

SMARTPHONE ACCESSIBILITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	319	86.2	86.2	86.2
	Only after joining the university	37	10.0	10.0	96.2
	Do not have access to	14	3.8	3.8	100.0
	Total	370	100.0	100.0	

TABLET/IPAD OWNERSHIP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	177	47.8	47.8	47.8

	Only after joining the university	27	7.3	7.3	55.1
	Do not have access to	166	44.9	44.9	100.0
	Total	370	100.0	100.0	

INTERNET ACCESSIBILITY

		FREQUENCY	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	280	75.7	75.7	75.7
	Only after joining the university	70	18.9	18.9	94.6
	Do not have access to	20	5.4	5.4	100.0
	Total	370	100.0	100.0	

GAME CONSOLE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	146	39.5	39.5	39.5
	Only after joining the university	15	4.1	4.1	43.5
	Do not have access to	209	56.5	56.5	100.0
	Total	370	100.0	100.0	

INFORMATION ABOUT TECHNOLOGY OWNERSHIP- APPENDIX G

COMPUTER OWNERSHIP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	137	37.0	37.0	37.0
	Only after joining the university	39	10.5	10.5	47.6
	Do not own	194	52.4	52.4	100.0
	Total	370	100.0	100.0	

INTERNET OWNERSHIP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	269	72.7	72.7	72.7
	Only after joining the university	57	15.4	15.4	88.1
	Do not own	44	11.9	11.9	100.0
	Total	370	100.0	100.0	

LAPTOP OWNERSHIP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	171	46.2	46.2	46.2
	Only after joining the university	175	47.3	47.3	93.5
	Do not Own	24	6.5	6.5	100.0
	Total	370	100.0	100.0	

TABLET/IPAD OWNERSHIP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	142	38.4	38.4	38.4
	Only after joining the university	26	7.0	7.0	45.4
	Do not own	202	54.6	54.6	100.0

	Total	370	100.0	100.0	

GAME CONSOLE OWNERSHIP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before coming to university	139	37.6	37.6	37.6
	Only after joining the university	13	3.5	3.5	41.1
	Do not own	218	58.9	58.9	100.0
	Total	370	100.0	100.0	

DESCRIPTIVE STATISTICS OF DIGITAL CAPABILITY DIVIDE - APPENDIX H

Information about Technology Skills

I am competent in using Desktop Computer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly disagree	11	3.0	3.0	3.0
	Disagree	14	3.8	3.8	6.8
	Neutral	75	20.3	20.3	27.0
	Agree	120	32.4	32.4	59.5
	Strongly Agree	150	40.5	40.5	100.0
	Total	370	100.0	100.0	

I am competent in using Tablet/iPad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	21	5.7	5.7	5.7
	Disagree	18	4.9	4.9	10.5
	Neutral	95	25.7	25.7	36.2
	Agree	88	23.8	23.8	60.0
	Strongly Agree	148	40.0	40.0	100.0
	Total	370	100.0	100.0	

I am competent in Using smartphones

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	2.7	2.7	2.7
	Disagree	3	.8	.8	3.5
	Neutral	20	5.4	5.4	8.9
	Agree	92	24.9	24.9	33.8
	Strongly Agree	245	66.2	66.2	100.0
	Total	370	100.0	100.0	

I am competent in using kindle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Disagree	52	14.1	14.1	14.1
	Disagree	58	15.7	15.7	29.7
	Neutral	137	37.0	37.0	66.8

	Agree	55	14.9	14.9	81.6
	Strongly Agree	68	18.4	18.4	100.0
	Total	370	100.0	100.0	

I can browse the internet without Help

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	2.2	2.2	2.2
	Disagree	8	2.2	2.2	4.3
	Neutral	22	5.9	5.9	10.3
	Agree	78	21.1	21.1	31.4
	Strongly Agree	254	68.6	68.6	100.0
	Total	370	100.0	100.0	

I feel comfortable using technologies for learning purposes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	1.1	1.1	1.1
	Disagree	12	3.2	3.2	4.3
	Neutral	34	9.2	9.2	13.5
	Agree	77	20.8	20.8	34.3
	Strongly Agree	243	65.7	65.7	100.0
	Total	370	100.0	100.0	

APPENDIX I –

DESCRIPTIVE STATISTICS OF DIGITAL OUTCOME DIVIDE CONSTRUCT

INFORMANCE ABOUT PERFORMANCE

Having access to Any form of Technology before entering University

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	48	13.0	13.0	13.0
	Yes	322	87.0	87.0	100.0
	Total	370	100.0	100.0	

Having access to Technology before coming to University has improved my current study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.5	.6	.6
	Disagree	3	.8	.9	1.5
	Neutral	31	8.4	9.5	11.0
	Agree	104	28.1	31.8	42.8
	Strongly Agree	187	50.5	57.2	100.0
	Total	327	88.4	100.0	
Missing	System	43	11.6		
Total		370	100.0		

Not having access to Technology before coming to the university has negatively affected my current study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.5	4.5	4.5
	Disagree	5	1.4	11.4	15.9
	Neutral	10	2.7	22.7	38.6
	Agree	12	3.2	27.3	65.9
	Strongly Agree	15	4.1	34.1	100.0
	Total	44	11.9	100.0	
Missing	System	326	88.1		
Total		370	100.0		

Perceived Usefulness- APPENDIX J

I do find technology Useful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.4	2.4	2.4
	Disagree	4	1.1	1.1	3.5
	Neutral	12	3.2	3.3	6.8
	Agree	72	19.5	19.5	26.3
	Strongly Agree	272	73.5	73.7	100.0
	Total	369	99.7	100.0	
Missing	System	1	.3		
Total		370	100.0		

Using Technology makes me accomplish my learning task quicker

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.3	.3	.3
	Disagree	3	.8	.8	1.1
	Neutral	34	9.2	9.2	10.3
	Agree	97	26.2	26.2	36.5
	Strongly Agree	235	63.5	63.5	100.0
	Total	370	100.0	100.0	

Having Access to technology has enhanced my academic performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.5	.5	.5
	Disagree	4	1.1	1.1	1.6
	Neutral	58	15.7	15.7	17.3
	Agree	104	28.1	28.1	45.4
	Strongly Agree	202	54.6	54.6	100.0
	Total	370	100.0	100.0	

Perceived Ease of Use- APPENDIX K

My Interaction with technology is clear and Understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	1.9	1.9	1.9
	Neutral	50	13.5	13.5	15.4
	Agree	146	39.5	39.5	54.9
	Strongly Agree	167	45.1	45.1	100.0
	Total	370	100.0	100.0	

I find technology easy to use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.5	.5	.5
	Disagree	16	4.3	4.3	4.9
	Neutral	41	11.1	11.1	15.9
	Agree	140	37.8	37.8	53.8
	Stronlgy Agree	171	46.2	46.2	100.0
	Total	370	100.0	100.0	

Learning to operate computer is easy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	.8	.8	.8
	Disagree	26	7.0	7.0	7.8
	Neutral	78	21.1	21.1	28.9
	Agree	114	30.8	30.8	59.7
	Stronlgy Agree	149	40.3	40.3	100.0
	Total	370	100.0	100.0	

I find it easy to download learning material

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.5	.5	.5
	Disagree	14	3.8	3.8	4.3
	Neutral	41	11.1	11.1	15.4
	Agree	109	29.5	29.5	44.9
	Strongly Disagree	204	55.1	55.1	100.0

	Total	370	100.0	100.0	

I find it easy to study online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	1.4	1.4	1.4
	Disagree	21	5.7	5.7	7.0
	Neutral	85	23.0	23.0	30.0
	Agree	116	31.4	31.4	61.4
	Strongly Agree	143	38.6	38.6	100.0
	Total	370	100.0	100.0	

I find it easy to do my assignment on computers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	1.9	1.9	1.9
	Disagree	13	3.5	3.5	5.4
	Neutral	52	14.1	14.1	19.5
	Agree	112	30.3	30.3	49.7
	Strongly Agree	186	50.3	50.3	100.0
	Total	370	100.0	100.0	

Appendix L

CROSS-TABULATIONS AND CHI-SQUARE TESTS

Race * Did you have access to Any form of Technology before entering University Cross tabulation

			Did you have access to Any form of Technology before entering University		Total
			NO	Yes	
Race	African	Count	46	162	208
		% within Race	22.1%	77.9%	100.0%
	White	Count	1	22	23
		% within Race	4.3%	95.7%	100.0%
	Indian	Count	1	116	117
		% within Race	0.9%	99.1%	100.0%
	Colored	Count	0	22	22
		% within Race	0.0%	100.0%	100.0%
Total		Count	48	322	370
		% within Race	13.0%	87.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.413[a]	3	.000
Likelihood Ratio	46.003	3	.000
Linear-by-Linear Association	32.845	1	.000
N of Valid Cases	370		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.85.

Gender * Did you have access to Any form of Technology before entering University Cross tabulation

			Did you have access to Any form of Technology before entering University		Total
			NO	Yes	
Gender	Male	Count	19	125	144
		% within Gender	13.2%	86.8%	100.0%
	Female	Count	29	197	226
		% within Gender	12.8%	87.2%	100.0%

Total	Count	48	322	370
	% within Gender	13.0%	87.0%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.010[a]	1	.919		
Continuity Correction	.000	1	1.000		
Likelihood Ratio	.010	1	.919		
Fisher's Exact Test				1.000	.519
Linear-by-Linear Association	.010	1	.919		
N of Valid Cases	370				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.68.

b. Computed only for a 2x2 table

Did you have access to Any form of Technology before entering University * I am competent in using Desktop Computer Cross tabulation

			I am competent in using Desktop Computer					
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Did you have access to Any form of Technology before entering University	NO	Count	3	7	14	13	11	48
		% within Did you have access to Any form of Technology before entering University	6.3%	14.6%	29.2%	27.1%	22.9%	100.0%
	Yes	Count	8	7	61	107	139	322
		% within Did you have access to Any form of Technology before entering University	2.5%	2.2%	18.9%	33.2%	43.2%	100.0%
Total		Count	11	14	75	120	150	370
		% within Did you have access to Any form of Technology before entering University	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.859[a]	4	.000
Likelihood Ratio	20.067	4	.000
Linear-by-Linear Association	18.011	1	.000
N of Valid Cases	370		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.43.

Did you have access to Any form of Technology before entering University * I can browse the internet without Help Cross tabulation

			I can browse the internet without Help					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Did you have access to Any form of Technology before entering University	NO	Count	3	3	7	16	19	48
		% within Did you have access to Any form of Technology before entering University	6.3%	6.3%	14.6%	33.3%	39.6%	100.0%
	Yes	Count	5	5	15	62	235	322
		% within Did you have access to Any form of Technology before entering University	1.6%	1.6%	4.7%	19.3%	73.0%	100.0%
Total		Count	8	8	22	78	254	370
		% within Did you have access to Any form of Technology before entering University	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.161[a]	4	.000
Likelihood Ratio	22.623	4	.000

Linear-by-Linear Association	24.539	1	.000
N of Valid Cases	370		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.04.

Computer Ownership * I am competent in using Desktop Computer Cross tabulation

			I am competent in using Desktop Computer					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	
Computer Ownership	Before coming to university	Count	3	1	11	37	85	137
		% within Computer Ownership	2.2%	0.7%	8.0%	27.0%	62.0%	100.0%
	Only after joining the university	Count	2	1	13	14	9	39
		% within Computer Ownership	5.1%	2.6%	33.3%	35.9%	23.1%	100.0%
	Do not own	Count	6	12	51	69	56	194
		% within Computer Ownership	3.1%	6.2%	26.3%	35.6%	28.9%	100.0%
Total		Count	11	14	75	120	150	370
		% within Computer Ownership	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	51.323[a]	8	.000
Likelihood Ratio	53.812	8	.000
Linear-by-Linear Association	31.494	1	.000
N of Valid Cases	370		

a. 3 cells (20.0%) have expected count less than 5. The minimum expected count is 1.16.

Internet Ownership * I can browse the internet without Help Cross tabulation

			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Ownership	Before coming to university	Count	5	3	11	48	202	269
		% within Internet Ownership	1.9%	1.1%	4.1%	17.8%	75.1%	100.0%
	Only after joining the university	Count	2	2	6	17	30	57
		% within Internet Ownership	3.5%	3.5%	10.5%	29.8%	52.6%	100.0%
	Do not own	Count	1	3	5	13	22	44
		% within Internet Ownership	2.3%	6.8%	11.4%	29.5%	50.0%	100.0%
Total		Count	8	8	22	78	254	370
		% within Internet Ownership	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.477[a]	8	.003
Likelihood Ratio	21.404	8	.006
Linear-by-Linear Association	15.292	1	.000
N of Valid Cases	370		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .95.

Did you have access to Any form of Technology before entering University * I feel comfortable using technologies for learning purposes Cross tabulation

			I feel comfortable using technologies for learning purposes					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Did you have access to Any form of Technology before entering University	NO	Count	0	3	6	13	26	48
		% within Did you have access to Any form of Technology before entering University	0.0%	6.3%	12.5%	27.1%	54.2%	100.0%
	Yes	Count	4	9	28	64	217	322
		% within Did you have access to Any form of Technology before entering University	1.2%	2.8%	8.7%	19.9%	67.4%	100.0%
Total		Count	4	12	34	77	243	370
		% within Did you have access to Any form of Technology before entering University	1.1%	3.2%	9.2%	20.8%	65.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.947[a]	4	.293
Likelihood Ratio	5.110	4	.276
Linear-by-Linear Association	2.248	1	.134
N of Valid Cases	370		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .52.

GENDER * I AM COMPETENT IN USING DESKTOP COMPUTER

Crosstab

			I am competent in using Desktop Computer					
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Male	Count	4	3	28	47	62	144
		% within Gender	2.8%	2.1%	19.4%	32.6%	43.1%	100.0%
	Female	Count	7	11	47	73	88	226
		% within Gender	3.1%	4.9%	20.8%	32.3%	38.9%	100.0%
Total		Count	11	14	75	120	150	370
		% within Gender	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.282[a]	4	.684
Likelihood Ratio	2.438	4	.656
Linear-by-Linear Association	1.231	1	.267
N of Valid Cases	370		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.28.

GENDER* LEVEL OF COMPETENCY WITH INTERNET BROWSING

Crosstab

			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Male	Count	2	3	10	30	99	144
		% within Gender	1.4%	2.1%	6.9%	20.8%	68.8%	100.0%
	Female	Count	6	5	12	48	155	226
		% within Gender	2.7%	2.2%	5.3%	21.2%	68.6%	100.0%
Total		Count	8	8	22	78	254	370
		% within Gender	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.061[a]	4	.900
Likelihood Ratio	1.096	4	.895
Linear-by-Linear Association	.077	1	.781
N of Valid Cases	370		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 3.11.

GENDER* I FEEL COMFORTABLE USING TECHNOLOGIES FOR LEARNING PURPOSES CROSS TABULATION

Gender * I feel comfortable using technologies for learning purposes Cross tabulation

			I feel comfortable using technologies for learning purposes					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Male	Count	2	4	15	29	94	144
		% within Gender	1.4%	2.8%	10.4%	20.1%	65.3%	100.0%
	Female	Count	2	8	19	48	149	226
		% within Gender	0.9%	3.5%	8.4%	21.2%	65.9%	100.0%
Total		Count	4	12	34	77	243	370
		% within Gender	1.1%	3.2%	9.2%	20.8%	65.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.807[a]	4	.937
Likelihood Ratio	.800	4	.938
Linear-by-Linear Association	.081	1	.776
N of Valid Cases	370		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.56.

Internet Accessibility * Having access to Technology before coming to University has improved my current study Cross tabulation

			Having access to Technology before coming to University has improved my current study					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Accessibility	Before coming to university	Count	2	0	18	90	153	263
		% within Internet Accessibility	0.8%	0.0%	6.8%	34.2%	58.2%	100.0%
	Only after joining the university	Count	0	3	8	12	28	51
		% within Internet Accessibility	0.0%	5.9%	15.7%	23.5%	54.9%	100.0%
	Do not have access to	Count	0	0	5	2	6	13
		% within Internet Accessibility	0.0%	0.0%	38.5%	15.4%	46.2%	100.0%
Total		Count	2	3	31	104	187	327
		% within Internet Accessibility	0.6%	0.9%	9.5%	31.8%	57.2%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.290[a]	8	.000
Likelihood Ratio	25.784	8	.001
Linear-by-Linear Association	6.674	1	.010
N of Valid Cases	327		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .08.

Computer Accessibility * Having access to Technology before coming to University has improved my current study Cross tabulation

			Having access to Technology before coming to University has improved my current study					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Computer Accessibility	Before coming to university	Count	2	1	12	57	120	192
		% within Computer Accessibility	1.0%	0.5%	6.3%	29.7%	62.5%	100.0%
	Only after joining the university	Count	0	1	16	42	57	116
		% within Computer Accessibility	0.0%	0.9%	13.8%	36.2%	49.1%	100.0%
	Do not have access to	Count	0	1	3	5	10	19
		% within Computer Accessibility	0.0%	5.3%	15.8%	26.3%	52.6%	100.0%
Total		Count	2	3	31	104	187	327
		% within Computer Accessibility	0.6%	0.9%	9.5%	31.8%	57.2%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.326[a]	8	.074
Likelihood Ratio	12.944	8	.114
Linear-by-Linear Association	5.234	1	.022
N of Valid Cases	327		

a. 7 cells (46.7%) have expected count less than 5. The minimum expected count is .12.

Age * Did you have access to Any form of Technology before entering University Cross tabulation

			Did you have access to Any form of Technology before entering University		
			NO	Yes	Total
Age	17 and Below	Count	6	16	22
		% within Age	27.3%	72.7%	100.0%
	18-21	Count	37	289	326
		% within Age	11.3%	88.7%	100.0%
	22-25	Count	4	15	19
		% within Age	21.1%	78.9%	100.0%
	26 and Above	Count	1	2	3
		% within Age	33.3%	66.7%	100.0%
Total		Count	48	322	370
		% within Age	13.0%	87.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.161[a]	4	.000
Likelihood Ratio	22.623	4	.000
Linear-by-Linear Association	24.539	1	.000
N of Valid Cases	370		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.04.

RACE * I AM COMPETENT WITH DESKTOP COMPUTER

Crosstab

			I am competent in using Desktop Computer					
			Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	7	9	56	71	65	208
		% within Race	3.4%	4.3%	26.9%	34.1%	31.3%	100.0%
	White	Count	1	0	2	8	12	23
		% within Race	4.3%	0.0%	8.7%	34.8%	52.2%	100.0%
	Indian	Count	2	5	17	32	61	117
		% within Race	1.7%	4.3%	14.5%	27.4%	52.1%	100.0%
	Colored	Count	1	0	0	9	12	22
		% within Race	4.5%	0.0%	0.0%	40.9%	54.5%	100.0%
Total		Count	11	14	75	120	150	370
		% within Race	3.0%	3.8%	20.3%	32.4%	40.5%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.213[a]	12	.007
Likelihood Ratio	33.532	12	.001
Linear-by-Linear Association	14.452	1	.000
N of Valid Cases	370		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .65.

Crosstab								
			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	**African**	**Count**	**7**	**7**	**19**	**54**	**121**	**208**
		% within Race	**3.4%**	**3.4%**	**9.1%**	**26.0%**	**58.2%**	**100.0%**
	White	**Count**	**1**	**0**	**2**	**1**	**19**	**23**
		% within Race	**4.3%**	**0.0%**	**8.7%**	**4.3%**	**82.6%**	**100.0%**
	Indian	**Count**	**0**	**1**	**1**	**22**	**93**	**117**
		% within Race	**0.0%**	**0.9%**	**0.9%**	**18.8%**	**79.5%**	**100.0%**
	Colored	**Count**	**0**	**0**	**0**	**1**	**21**	**22**
		% within Race	**0.0%**	**0.0%**	**0.0%**	**4.5%**	**95.5%**	**100.0%**
Total		**Count**	**8**	**8**	**22**	**78**	**254**	**370**
		% within Race	**2.2%**	**2.2%**	**5.9%**	**21.1%**	**68.6%**	**100.0%**

RACE* I CAN BROWSE THE INTERNET WITHOUT HELP

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.284[a]	12	.000
Likelihood Ratio	45.195	12	.000
Linear-by-Linear Association	25.837	1	.000
N of Valid Cases	370		
a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .48.			

RACE* I FIND IT DIFFICULT TO USE COMPUTER APPLICATION

Race * I find it difficult to use computer application programs e.g. MS Word Cross tabulation					
			I find it difficult to use computer application programs e.g. MS Word		Total
			NO	Yes	
Race	African	Count	109	99	208
		% within Race	52.4%	47.6%	100.0%
	White	Count	21	2	23
		% within Race	91.3%	8.7%	100.0%
	Indian	Count	98	19	117
		% within Race	83.8%	16.2%	100.0%
	Colored	Count	19	3	22
		% within Race	86.4%	13.6%	100.0%
Total		Count	247	123	370
		% within Race	66.8%	33.2%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.608[a]	3	.000
Likelihood Ratio	47.767	3	.000
Linear-by-Linear Association	37.624	1	.000
N of Valid Cases	370		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.31.			

RACE * I FIND IT DIFFICULT TO NAVIGATE ON THE INTERNET CROSS TABULATION

Race * I find it difficult to navigate on the Internet Cross tabulation					
			I find it difficult to navigate on the Internet		
			NO	Yes	Total
Race	African	Count	148	60	208
		% within Race	71.2%	28.8%	100.0%
	White	Count	22	1	23
		% within Race	95.7%	4.3%	100.0%
	Indian	Count	111	6	117
		% within Race	94.9%	5.1%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	301	69	370
		% within Race	81.4%	18.6%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.781[a]	3	.000
Likelihood Ratio	37.123	3	.000
Linear-by-Linear Association	27.461	1	.000
N of Valid Cases	370		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.10.			

RACE * I FIND IT DIFFICULT TO DO MY LEARNING TASKS ON COMPUTER DUE TO MY UNFAMILIARITY WITH TECHNOLOGY CROSS TABULATION

Race * I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology Cross tabulation

			I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology		Total
			No	Yes	
Race	African	Count	152	56	208
		% within Race	73.1%	26.9%	100.0%
	White	Count	22	1	23
		% within Race	95.7%	4.3%	100.0%
	Indian	Count	108	9	117
		% within Race	92.3%	7.7%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	302	68	370
		% within Race	81.6%	18.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.314[a]	3	.000
Likelihood Ratio	25.635	3	.000
Linear-by-Linear Association	19.286	1	.000
N of Valid Cases	370		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.04.

RACE* I CANNOT DO ONLINE SELF-STUDIES DUE TO MY UNFAMILIARITY WITH TECHNOLOGIES CROSS TABULATION

Race * I cannot do Online self-studies due to my unfamiliarity with technologies Cross tabulation

			I cannot do online self-studies due to my unfamiliarity with technologies		Total
			No	Yes	
Race	African	Count	168	40	208
		% within Race	80.8%	19.2%	100.0%
	White	Count	23	0	23
		% within Race	100.0%	0.0%	100.0%
	Indian	Count	108	9	117
		% within Race	92.3%	7.7%	100.0%
	Colored	Count	20	2	22

		% within Race	90.9%	9.1%	100.0%
Total		Count	319	51	370
		% within Race	86.2%	13.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.931[a]	3	.005
Likelihood Ratio	16.238	3	.001
Linear-by-Linear Association	8.683	1	.003
N of Valid Cases	370		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.03.

RACE * I FIND IT DIFFICULT TO DOWNLOAD INFORMATIVE MATERIALS ONLINE TO SUPPORT MY LEARNING CROSS TABULATION

Race * I find it difficult to download Informative materials online to support my learning Cross tabulation

			I find it difficult to download Informative materials online to support my learning		Total
			NO	Yes	
Race	African	Count	157	51	208
		% within Race	75.5%	24.5%	100.0%
	White	Count	23	0	23
		% within Race	100.0%	0.0%	100.0%
	Indian	Count	105	12	117
		% within Race	89.7%	10.3%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	305	65	370
		% within Race	82.4%	17.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)

Pearson Chi-Square	17.253[a]	3	.001
Likelihood Ratio	21.440	3	.000
Linear-by-Linear Association	12.101	1	.001
N of Valid Cases	370		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.86.			

RACE * I DO NOT KNOW HOW TO USE PARTS OF THE COMPUTER E.G. KEYBOARD, FUNCTION KEYS CROSS TABULATION

Race * I do not know how to use parts of the computer e.g. keyboard, function keys Cross tabulation					
			I do not know how to use parts of the computer e.g. keyboard, function keys		
			No	Yes	Total
Race	African	Count	184	24	208
		% within Race	88.5%	11.5%	100.0%
	White	Count	23	0	23
		% within Race	100.0%	0.0%	100.0%
	Indian	Count	114	3	117
		% within Race	97.4%	2.6%	100.0%
	Colored	Count	20	2	22
		% within Race	90.9%	9.1%	100.0%
Total		Count	341	29	370
		% within Race	92.2%	7.8%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.452[a]	3	.015
Likelihood Ratio	13.265	3	.004
Linear-by-Linear Association	6.015	1	.014
N of Valid Cases	370		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 1.72.			

RACE * I DO FIND TECHNOLOGY USEFUL

Crosstab		
	I do find technology Useful	**Total**

			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	**African**	**Count**	**6**	**4**	**8**	**44**	**145**	**207**
		% within Race	**2.9%**	**1.9%**	**3.9%**	**21.3%**	**70.0%**	**100.0%**
	White	**Count**	**1**	**0**	**0**	**5**	**17**	**23**
		% within Race	**4.3%**	**0.0%**	**0.0%**	**21.7%**	**73.9%**	**100.0%**
	Indian	**Count**	**2**	**0**	**4**	**19**	**92**	**117**
		% within Race	**1.7%**	**0.0%**	**3.4%**	**16.2%**	**78.6%**	**100.0%**
	Colored	**Count**	**0**	**0**	**0**	**4**	**18**	**22**
		% within Race	**0.0%**	**0.0%**	**0.0%**	**18.2%**	**81.8%**	**100.0%**
Total		**Count**	**9**	**4**	**12**	**72**	**272**	**369**
		% within Race	**2.4%**	**1.1%**	**3.3%**	**19.5%**	**73.7%**	**100.0%**

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.158[a]	12	.773
Likelihood Ratio	11.613	12	.477
Linear-by-Linear Association	4.564	1	.033
N of Valid Cases	369		

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .24.

RACE* USING TECHNOLOGY MAKES ME ACCOMPLISH MY LEARNING TASK QUICKER

Crosstab

			Using Technology makes me accomplish my learning task quicker					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	1	2	17	60	128	208
		% within Race	0.5%	1.0%	8.2%	28.8%	61.5%	100.0%
	White	Count	0	0	1	7	15	23
		% within Race	0.0%	0.0%	4.3%	30.4%	65.2%	100.0%
	Indian	Count	0	0	13	26	78	117
		% within Race	0.0%	0.0%	11.1%	22.2%	66.7%	100.0%
	Colored	Count	0	1	3	4	14	22
		% within Race	0.0%	4.5%	13.6%	18.2%	63.6%	100.0%
Total		Count	1	3	34	97	235	370
		% within Race	0.3%	0.8%	9.2%	26.2%	63.5%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.801[a]	12	.633
Likelihood Ratio	9.465	12	.663
Linear-by-Linear Association	.055	1	.815
N of Valid Cases	370		
a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .06.			

RACE* HAVING ACCESS TO TECHNOLOGY HAS ENHANCED MY ACADEMIC PERFORMANCE

Crosstab								
			Having Access to technology has enhanced my academic performance					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Race	African	Count	2	3	40	61	102	208
		% within Race	1.0%	1.4%	19.2%	29.3%	49.0%	100.0%
	White	Count	0	0	5	6	12	23
		% within Race	0.0%	0.0%	21.7%	26.1%	52.2%	100.0%
	Indian	Count	0	1	11	33	72	117
		% within Race	0.0%	0.9%	9.4%	28.2%	61.5%	100.0%
	Colored	Count	0	0	2	4	16	22
		% within Race	0.0%	0.0%	9.1%	18.2%	72.7%	100.0%
Total		Count	2	4	58	104	202	370
		% within Race	0.5%	1.1%	15.7%	28.1%	54.6%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.588[a]	12	.400
Likelihood Ratio	14.219	12	.287
Linear-by-Linear Association	10.455	1	.001
N of Valid Cases	370		

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .12.

RACE * MY INTERACTION WITH TECHNOLOGY IS CLEAR AND UNDERSTANDABLE

Crosstab

			My Interaction with technology is clear and Understandable				Total
			Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	7	43	84	74	208
		% within Race	3.4%	20.7%	40.4%	35.6%	100.0%
	White	Count	0	1	6	16	23
		% within Race	0.0%	4.3%	26.1%	69.6%	100.0%
	Indian	Count	0	6	45	66	117
		% within Race	0.0%	5.1%	38.5%	56.4%	100.0%
	Colored	Count	0	0	11	11	22
		% within Race	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	7	50	146	167	370
		% within Race	1.9%	13.5%	39.5%	45.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	36.231[a]	9	.000
Likelihood Ratio	42.872	9	.000
Linear-by-Linear Association	25.551	1	.000
N of Valid Cases	370		

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .42.

Crosstab								
			I find technology easy to use					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	1	16	34	80	77	208
		% within Race	0.5%	7.7%	16.3%	38.5%	37.0%	100.0%
	White	Count	1	0	0	6	16	23
		% within Race	4.3%	0.0%	0.0%	26.1%	69.6%	100.0%
	Indian	Count	0	0	7	43	67	117
		% within Race	0.0%	0.0%	6.0%	36.8%	57.3%	100.0%
	Colored	Count	0	0	0	11	11	22
		% within Race	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	2	16	41	140	171	370
		% within Race	0.5%	4.3%	11.1%	37.8%	46.2%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	43.417[a]	12	.000
Likelihood Ratio	47.367	12	.000
Linear-by-Linear Association	28.084	1	.000
N of Valid Cases	370		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .18.

Crosstab								
			Learning to operate computer is easy					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	2	23	54	71	58	208
		% within Race	1.0%	11.1%	26.0%	34.1%	27.9%	100.0%
	White	Count	1	0	1	6	15	23
		% within Race	4.3%	0.0%	4.3%	26.1%	65.2%	100.0%
	Indian	Count	0	3	19	32	63	117
		% within Race	0.0%	2.6%	16.2%	27.4%	53.8%	100.0%
	Colored	Count	0	0	4	5	13	22
		% within Race	0.0%	0.0%	18.2%	22.7%	59.1%	100.0%

Crosstab								
			I find it easy to download learning material					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree	
Race	African	Count	2	14	30	67	95	208
		% within Race	1.0%	6.7%	14.4%	32.2%	45.7%	100.0%
	White	Count	0	0	1	5	17	23
		% within Race	0.0%	0.0%	4.3%	21.7%	73.9%	100.0%
	Indian	Count	0	0	9	32	76	117
		% within Race	0.0%	0.0%	7.7%	27.4%	65.0%	100.0%
	Colored	Count	0	0	1	5	16	22
		% within Race	0.0%	0.0%	4.5%	22.7%	72.7%	100.0%
Total		Count	2	14	41	109	204	370
		% within Race	0.5%	3.8%	11.1%	29.5%	55.1%	100.0%
Total		Count	3	26	78	114	149	370
		% within Race	0.8%	7.0%	21.1%	30.8%	40.3%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	43.417[a]	12	.000
Likelihood Ratio	47.367	12	.000
Linear-by-Linear Association	28.084	1	.000
N of Valid Cases	370		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .18.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.205[a]	12	.007
Likelihood Ratio	33.576	12	.001
Linear-by-Linear Association	22.456	1	.000
N of Valid Cases	370		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .12.

Crosstab

			I find it easy to study online					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	4	12	44	68	80	208
		% within Race	1.9%	5.8%	21.2%	32.7%	38.5%	100.0%
	White	Count	0	0	3	4	16	23
		% within Race	0.0%	0.0%	13.0%	17.4%	69.6%	100.0%
	Indian	Count	1	7	32	39	38	117
		% within Race	0.9%	6.0%	27.4%	33.3%	32.5%	100.0%
	Colored	Count	0	2	6	5	9	22
		% within Race	0.0%	9.1%	27.3%	22.7%	40.9%	100.0%
Total		Count	5	21	85	116	143	370
		% within Race	1.4%	5.7%	23.0%	31.4%	38.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.634[a]	12	.262
Likelihood Ratio	15.869	12	.197
Linear-by-Linear Association	.421	1	.517
N of Valid Cases	370		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .30.

Crosstab

			I find it easy to do my assignment on computers					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Race	African	Count	7	11	38	64	88	208
		% within Race	3.4%	5.3%	18.3%	30.8%	42.3%	100.0%
	White	Count	0	0	2	4	17	23
		% within Race	0.0%	0.0%	8.7%	17.4%	73.9%	100.0%
	Indian	Count	0	2	12	38	65	117
		% within Race	0.0%	1.7%	10.3%	32.5%	55.6%	100.0%
	Colored	Count	0	0	0	6	16	22
		% within Race	0.0%	0.0%	0.0%	27.3%	72.7%	100.0%

Total	Count	7	13	52	112	186	370
	% within Race	1.9%	3.5%	14.1%	30.3%	50.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.943[a]	12	.008
Likelihood Ratio	33.961	12	.001
Linear-by-Linear Association	19.720	1	.000
N of Valid Cases	370		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .42.

Appendix M

Computer Ownership * I find it easy to download learning material

Crosstab

			I find it easy to download learning material					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree	
Computer Ownership	Before coming to university	Count	0	0	11	32	94	137
		% within Computer Ownership	0.0%	0.0%	8.0%	23.4%	68.6%	100.0%
	Only after joining the university	Count	1	2	4	15	17	39
		% within Computer Ownership	2.6%	5.1%	10.3%	38.5%	43.6%	100.0%
	Do not own	Count	1	12	26	62	93	194
		% within Computer Ownership	0.5%	6.2%	13.4%	32.0%	47.9%	100.0%
Total		Count	2	14	41	109	204	370
		% within Computer Ownership	0.5%	3.8%	11.1%	29.5%	55.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.638[a]	8	.002
Likelihood Ratio	28.566	8	.000
Linear-by-Linear Association	16.520	1	.000
N of Valid Cases	370		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .21.

Computer Ownership * Learning to operate computer is easy

Crosstab

			Learning to operate computer is easy					
			Strongly Disagree	Disagree	Neutral	Agree	Stronlgy Agree	Total
Computer Ownership	Before coming to university	Count	0	1	23	34	79	137
		% within Computer Ownership	0.0%	0.7%	16.8%	24.8%	57.7%	100.0%
	Only after joining the university	Count	0	5	8	12	14	39
		% within Computer Ownership	0.0%	12.8%	20.5%	30.8%	35.9%	100.0%
	Do not own	Count	3	20	47	68	56	194
		% within Computer Ownership	1.5%	10.3%	24.2%	35.1%	28.9%	100.0%
Total		Count	3	26	78	114	149	370
		% within Computer Ownership	0.8%	7.0%	21.1%	30.8%	40.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	36.877[a]	8	.000
Likelihood Ratio	41.864	8	.000
Linear-by-Linear Association	29.221	1	.000
N of Valid Cases	370		

a. 4 cells (26.7%) have expected count less than 5. The minimum expected count is .32.

Computer Ownership * I find it easy to do my assignment on computers

Crosstab

			I find it easy to do my assignment on computers					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Computer Ownership	Before coming to university	Count	1	1	10	35	90	137
		% within Computer Ownership	0.7%	0.7%	7.3%	25.5%	65.7%	100.0%
	Only after joining the university	Count	1	1	2	19	16	39
		% within Computer Ownership	2.6%	2.6%	5.1%	48.7%	41.0%	100.0%
	Do not own	Count	5	11	40	58	80	194
		% within Computer Ownership	2.6%	5.7%	20.6%	29.9%	41.2%	100.0%
Total		Count	7	13	52	112	186	370
		% within Computer Ownership	1.9%	3.5%	14.1%	30.3%	50.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.547[a]	8	.000
Likelihood Ratio	36.818	8	.000
Linear-by-Linear Association	25.117	1	.000
N of Valid Cases	370		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .74.

Computer Ownership * I find it difficult to use computer application programs e.g MS Word

Crosstab

			I find it difficult to use computer application programs e.g MS Word		Total
			NO	Yes	
Computer Ownership	Before coming to university	Count	112	25	137
		% within Computer Ownership	81.8%	18.2%	100.0%
	Only after joining the university	Count	19	20	39
		% within Computer Ownership	48.7%	51.3%	100.0%
	Do not own	Count	116	78	194
		% within Computer Ownership	59.8%	40.2%	100.0%
Total		Count	247	123	370
		% within Computer Ownership	66.8%	33.2%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.838[a]	2	.000
Likelihood Ratio	24.880	2	.000
Linear-by-Linear Association	16.171	1	.000
N of Valid Cases	370		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.96.

Computer Ownership * I find it difficult to download Informative materials online to support my learning

Crosstab

			I find it difficult to download Informative materials online to support my learning		Total
			NO	Yes	
Computer Ownership	Before coming to university	Count	119	18	137

		% within Computer Ownership	86.9%	13.1%	100.0%
	Only after joining the university	Count	30	9	39
		% within Computer Ownership	76.9%	23.1%	100.0%
	Do not own	Count	156	38	194
		% within Computer Ownership	80.4%	19.6%	100.0%
Total		Count	305	65	370
		% within Computer Ownership	82.4%	17.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.220[a]	2	.200
Likelihood Ratio	3.288	2	.193
Linear-by-Linear Association	2.132	1	.144
N of Valid Cases	370		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.85.

Computer Ownership * I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology

Crosstab

			I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology		
			No	Yes	Total
Computer Ownership	Before coming to university	Count	128	9	137
		% within Computer Ownership	93.4%	6.6%	100.0%
	Only after joining the university	Count	32	7	39
		% within Computer Ownership	82.1%	17.9%	100.0%
	Do not own	Count	142	52	194
		% within Computer Ownership	73.2%	26.8%	100.0%
Total		Count	302	68	370
		% within Computer Ownership	81.6%	18.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.922[a]	2	.000
Likelihood Ratio	24.384	2	.000
Linear-by-Linear Association	21.826	1	.000
N of Valid Cases	370		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.17.

Internet Accessibility * I can browse the internet without Help

Crosstab								
			I can browse the internet without Help					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Accessibility	Before coming to university	Count	4	2	11	50	213	280
		% within Internet Accessibility	1.4%	0.7%	3.9%	17.9%	76.1%	100.0%
	Only after joining the university	Count	4	4	9	23	30	70
		% within Internet Accessibility	5.7%	5.7%	12.9%	32.9%	42.9%	100.0%
	Do not have access to	Count	0	2	2	5	11	20
		% within Internet Accessibility	0.0%	10.0%	10.0%	25.0%	55.0%	100.0%
Total		Count	8	8	22	78	254	370
		% within Internet Accessibility	2.2%	2.2%	5.9%	21.1%	68.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.493[a]	8	.000
Likelihood Ratio	36.889	8	.000
Linear-by-Linear Association	23.826	1	.000
N of Valid Cases	370		

a. 7 cells (46.7%) have expected count less than 5. The minimum expected count is .43.

Internet Accessibility * I find it difficult to navigate on the Internet

Crosstab

			I find it difficult to navigate on the Internet		
			NO	Yes	Total
Internet Accessibility	Before coming to university	Count	237	43	280
		% within Internet Accessibility	84.6%	15.4%	100.0%
	Only after joining the university	Count	54	16	70
		% within Internet Accessibility	77.1%	22.9%	100.0%
	Do not have access to	Count	10	10	20
		% within Internet Accessibility	50.0%	50.0%	100.0%
Total		Count	301	69	370
		% within Internet Accessibility	81.4%	18.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.775[a]	2	.000
Likelihood Ratio	12.865	2	.002
Linear-by-Linear Association	13.441	1	.000
N of Valid Cases	370		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.73.

Crosstab

			I find it difficult to navigate on the Internet		
			NO	Yes	Total
Internet Accessibility	Before coming to university	Count	237	43	280
		% within Internet Accessibility	84.6%	15.4%	100.0%
	Only after joining the university	Count	54	16	70
		% within Internet Accessibility	77.1%	22.9%	100.0%
	Do not have access to	Count	10	10	20
		% within Internet Accessibility	50.0%	50.0%	100.0%
Total		Count	301	69	370
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Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.775[a]	2	.000
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Linear-by-Linear Association	13.441	1	.000
N of Valid Cases	370		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.73.

Internet Accessibility * I find it easy to download learning material

Crosstab

			I find it easy to download learning material					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree	
Internet Accessibility	Before coming to university	Count	0	6	29	79	166	280
		% within Internet Accessibility	0.0%	2.1%	10.4%	28.2%	59.3%	100.0%
	Only after joining the university	Count	1	6	10	24	29	70
		% within Internet Accessibility	1.4%	8.6%	14.3%	34.3%	41.4%	100.0%
	Do not have access to	Count	1	2	2	6	9	20
		% within Internet Accessibility	5.0%	10.0%	10.0%	30.0%	45.0%	100.0%
Total		Count	2	14	41	109	204	370
		% within Internet Accessibility	0.5%	3.8%	11.1%	29.5%	55.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.306[a]	8	.003
Likelihood Ratio	18.561	8	.017
Linear-by-Linear Association	13.547	1	.000
N of Valid Cases	370		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .11.

Crosstab

			I find it easy to study online					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Accessibility	Before coming to university	Count	2	15	65	87	111	280
		% within Internet Accessibility	0.7%	5.4%	23.2%	31.1%	39.6%	100.0%
	Only after joining the university	Count	2	5	16	23	24	70
		% within Internet Accessibility	2.9%	7.1%	22.9%	32.9%	34.3%	100.0%
	Do not have access to	Count	1	1	4	6	8	20
		% within Internet Accessibility	5.0%	5.0%	20.0%	30.0%	40.0%	100.0%
Total		Count	5	21	85	116	143	370
		% within Internet Accessibility	1.4%	5.7%	23.0%	31.4%	38.6%	100.0%

Internet Accessibility * I find it easy to study online

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.897[a]	8	.769
Likelihood Ratio	3.970	8	.860
Linear-by-Linear Association	.934	1	.334
N of Valid Cases	370		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .27.

Internet Accessibility * I find it easy to do my assignment on computers

Crosstab

			I find it easy to do my assignment on computers					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Internet Accessibility	Before coming to university	Count	5	5	35	87	148	280
		% within Internet Accessibility	1.8%	1.8%	12.5%	31.1%	52.9%	100.0%
	Only after joining the university	Count	0	5	16	19	30	70
		% within Internet Accessibility	0.0%	7.1%	22.9%	27.1%	42.9%	100.0%
	Do not have access to	Count	2	3	1	6	8	20
		% within Internet Accessibility	10.0%	15.0%	5.0%	30.0%	40.0%	100.0%
Total		Count	7	13	52	112	186	370
		% within Internet Accessibility	1.9%	3.5%	14.1%	30.3%	50.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	28.156[a]	8	.000
Likelihood Ratio	22.329	8	.004
Linear-by-Linear Association	9.605	1	.002
N of Valid Cases	370		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .38.

Internet Accessibility * I find it difficult to download Informative materials online to support my learning

Crosstab

			I find it difficult to download Informative materials online to support my learning		
			NO	Yes	Total
Internet Accessibility	Before coming to university	Count	243	37	280
		% within Internet Accessibility	86.8%	13.2%	100.0%
	Only after joining the university	Count	47	23	70
		% within Internet Accessibility	67.1%	32.9%	100.0%
	Do not have access to	Count	15	5	20
		% within Internet Accessibility	75.0%	25.0%	100.0%
Total		Count	305	65	370
		% within Internet Accessibility	82.4%	17.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.727[a]	2	.000
Likelihood Ratio	14.149	2	.001
Linear-by-Linear Association	10.981	1	.001
N of Valid Cases	370		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.51.

Did you have access to Any form of Technology before entering University * I find it difficult to download Informative materials online to support my learning

Crosstab

			I find it difficult to download Informative materials online to support my learning		
			NO	Yes	Total
Did you have access to Any form of Technology before entering University	NO	Count	31	17	48
		% within Did you have access to Any form of Technology before entering University	64.6%	35.4%	100.0%
	Yes	Count	274	48	322
		% within Did you have access to Any form of Technology before entering University	85.1%	14.9%	100.0%
Total		Count	305	65	370
		% within Did you have access to Any form of Technology before entering University	82.4%	17.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.134[a]	1	.000		
Continuity Correction[b]	10.759	1	.001		
Likelihood Ratio	10.351	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	12.101	1	.001		
N of Valid Cases	370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.43.

b. Computed only for a 2x2 table

Did you have access to Any form of Technology before entering University * I cannot do online self-studies due to my unfamiliarity with technologies

Crosstab

			I cannot do online self-studies due to my unfamiliarity with technologies		Total
			No	Yes	
Did you have access to Any form of Technology before entering University	NO	Count	30	18	48
		% within Did you have access to Any form of Technology before entering University	62.5%	37.5%	100.0%
	Yes	Count	289	33	322
		% within Did you have access to Any form of Technology before entering University	89.8%	10.2%	100.0%
Total		Count	319	51	370
		% within Did you have access to Any form of Technology before entering University	86.2%	13.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.105[a]	1	.000		
Continuity Correction[b]	23.862	1	.000		
Likelihood Ratio	20.397	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	26.034	1	.000		
N of Valid Cases	370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.62.

b. Computed only for a 2x2 table

Did you have access to Any form of Technology before entering University * I find it difficult to navigate on the Internet

Crosstab

			I find it difficult to navigate on the Internet		
			NO	Yes	Total
Did you have access to Any form of Technology before entering University	NO	Count	28	20	48
		% within Did you have access to Any form of Technology before entering University	58.3%	41.7%	100.0%
	Yes	Count	273	49	322
		% within Did you have access to Any form of Technology before entering University	84.8%	15.2%	100.0%
Total		Count	301	69	370
		% within Did you have access to Any form of Technology before entering University	81.4%	18.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.262[a]	1	.000		
Continuity Correction	17.558	1	.000		
Likelihood Ratio	16.161	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.210	1	.000		
N of Valid Cases	370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.95.

b. Computed only for a 2x2 table

Did you have access to Any form of Technology before entering University * I find it difficult to use computer application programs e.g MS Word

Crosstab

			I find it difficult to use computer application programs e.g MS Word		Total
			NO	Yes	
Did you have access to Any form of Technology before entering University	NO	Count	21	27	48
		% within Did you have access to Any form of Technology before entering University	43.8%	56.3%	100.0%
	Yes	Count	226	96	322
		% within Did you have access to Any form of Technology before entering University	70.2%	29.8%	100.0%
Total		Count	247	123	370
		% within Did you have access to Any form of Technology before entering University	66.8%	33.2%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.155[a]	1	.000		
Continuity Correction[b]	11.991	1	.001		
Likelihood Ratio	12.392	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.120	1	.000		
N of Valid Cases	370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.96.

b. Computed only for a 2x2 table

Did you have access to Any form of Technology before entering University * I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology

Crosstab

			I find it difficult to do my learning tasks on computer due to my unfamiliarity with technology		Total
			No	Yes	
Did you have access to Any form of Technology before entering University	NO	Count	23	25	48
		% within Did you have access to Any form of Technology before entering University	47.9%	52.1%	100.0%
	Yes	Count	279	43	322
		% within Did you have access to Any form of Technology before entering University	86.6%	13.4%	100.0%
Total		Count	302	68	370
		% within Did you have access to Any form of Technology before entering University	81.6%	18.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	41.770[a]	1	.000		
Continuity Correction[b]	39.228	1	.000		
Likelihood Ratio	33.451	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	41.657	1	.000		
N of Valid Cases	370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.82.

b. Computed only for a 2x2 table