

**DIGITAL LITERACY: AN INVESTIGATION INTO PERCEIVED COMPETENCIES
OF OPEN DISTANCE LEARNING STUDENTS IN THE EASTERN CAPE
PROVINCE IN SOUTH AFRICA**

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DECLARATION

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DIGITAL LITERACY: AN INVESTIGATION INTO PERCEIVED COMPETENCIES OF OPEN DISTANCE LEARNING STUDENTS IN THE EASTERN CAPE PROVINCE IN SOUTH AFRICA

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

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.



SIGNATURE

30 January 2020

DATE

DEDICATION

This dissertation is dedicated to my late parents, Amarsingh and Damyanti Narotam. You taught me many values and principles which shaped me into who I am today. The values with which I resonate most are the values of willpower and positive thinking. With these instilled values, I am able to achieve all that I have set my mind to do.

I would also like to dedicate this work to my husband, Sunil Daya and my children Nishaal and Perishka, Tasha and Jiten. I would not have been able to achieve my goals without your endless support, sacrifice and encouragement. I pray that you are also able to achieve all the goals that you have set for yourselves.

“If you believe it will work out, you’ll see opportunities. If you believe it won’t you will see obstacles.” Wayne Dyer

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“Today I choose to live with gratitude for the love that fills my heart, the peace that rests within my spirit, and the voice of hope that says all things are possible.” Anonymous

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ABBREVIATIONS

4IR	Fourth Industrial Revolution
CAES	College of Agriculture and Environment Sciences
CAS	College of Accounting Science
CEDU	College of Education
CEMS	College of Economics and Management Sciences
CGS	College of Graduate Studies
CHS	College of Human Sciences
CLAW	College of Law
CSET	College of Science, Engineering and Technology
DC	Digital competence
DE	Distance Education
DHET	Department of Higher Education and Training
DL	Digital Literacy
DLA	Digital Learning Advisors
DT	Digital Technology
EC	Eastern Cape
ECDL	European Computer Driving Licence
G20	Group of Twenty
HE	Higher Education
ICT	Information and Communications Technology
LMS	Learner Management System
M & D	Master's and Doctoral
MOOC	Massive Open Online Courses
MS	Microsoft
NeSPA	National e-Skills Plan of Action (2012)
NQF	National Quality Framework
ODL	Open Distance Learning
ODeL	Open Distance e-Learning

OER	Open Educational Resources
RPL	Recognition of Prior Learning
SA	South Africa
SD	Standard Deviation
SMS	Short Message Service
SPSS	Statistical Package for the Social Science
UNISA	University of South Africa
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UTAUT	Unified Theory of Acceptance and Use of Technology
Wi-Fi	Wireless Fidelity
WWW	World Wide Web

“Education is no longer thought of as a preparation for adult life, but as a continuing process of growth and development from birth until death” – Stephen Mitchell

ABSTRACT

The aim of this study was to investigate and describe the perceived digital literacy competencies of Unisa Open Distance Learning students in the Eastern Cape province of South Africa. The association between the socio-demographic variables of the students and their perceived digital literacy competencies was statistically tested. The study examined whether there is a statistically significant relationship between the independent variables: attitudes towards digital technology for academic purposes, usage of the Learner Management System and attendance at regional digital literacy workshops, and the dependent variable, perceived digital literacy competencies. A quantitative, non-experimental, cross-sectional survey design was adopted using a census sampling method.

The study concluded that the majority of students have high self-perceived digital literacy competencies. Statistically significant positive relationships were found between attitude towards digital technology for educational purposes, usage of the Learner Management System and attendance at regional digital literacy workshops and perceived digital literacy competencies.

Keywords

Attitude towards digital technology; Digital literacy; Digital competence; Digital literacy workshops; Eastern Cape; Learner Management Systems; Open Distance Learning and Unisa.

CHAPTER 1

INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

This study focuses on the perceived digital literacy (DL) competencies of students registered at the University of South Africa (Unisa) in the Eastern Cape (EC) province of South Africa. The research addresses students' perceived DL competencies, attitudes towards digital technology (DT) for educational purposes, usage of the Learner Management Systems (LMS) and attendance at regional DL workshops. Chapter 1 provides an outline of the study.

This chapter outlines the background and rationale of the study, followed by the problem statement, research questions and the aim and objectives of the study. The research methodology and design followed, limitations and delimitations of the study and the definitions of the key concepts used in this study are also included, and the chapter concludes with the outline of the chapters to follow.

1.2 BACKGROUND

We are currently living in the 21st century, and DT affects all spheres of our lives. Over the past decade, digital technologies have become more and more embedded into our daily lives (Hossain, 2014; Pokpas, 2014), which necessitates that citizens acquire and master the appropriate skills and competencies to participate actively and confidently in educational, economic and social activities (Hossain, 2014; Shopova, 2014; Julien, 2015; Van Laar, Van Deursen, Van Dijk & De Haan, 2017; Framework for 21st century learning definitions, 2019). Examples of DT that have emerged over the past decade include smartphones, tablets, blogs, cloud storage, online purchasing, Facebook, twitter, big data, Internet of things, artificial intelligence

and many new technologies that continue to emerge daily as we move towards DT for the Fourth Industrial Revolution (4IR).

The influence of DT in the education sector is no exception, particularly in the field of distance education (DE). During the first generation of DE, which was commonly known as the postal-correspondence era (Rangara, 2015), students were exposed to text in printed format, or one-dimensional text. Over the years, this one-dimensional text has been replaced by multi-dimensional hypertext (Shopova, 2014). The need to acquire new DL skills has increased since the introduction of Web 2.0, the second generation of the World Wide Web, which focuses on the ability of people to collaborate, contribute to knowledge, create content and share information online (Shopova, 2014; Pokpas, 2014; Rangara, 2015; Drew & Forbes, 2017). The rapid growth in DT has of course had an impact on the transformation of higher education (HE) institutions.

Due to the introduction of DT, all HE institutions have had to adapt to ensure that students have the necessary DL competencies and are prepared for the workplace. Shannon (2015) states that preparing students to work in the 21st century is vital, that the digital skills required vary and are dynamic as technology advances and changes. Students need to be prepared for changes and thus need to be exposed to the different tools required by the technology (Hossain, 2014; Pokpas, 2014; Shannon, 2015). Due to a technology-driven 21st century workplace, proficient and critical use of technology should be taught to the students. Students should be able to sort and analyse online information and not simply to accept information at face value (Pokpas, 2014; Hilton & Canciello, 2015).

During the 1990s, several authors used the term DL, with the general understanding of DL as an ability to read and comprehend text that is displayed as hypertext or multimedia text (Bawden, 2001). Bawden (2001) states DL was widely promoted in a book titled *Digital Literacy*, by author Paul Gilster. Gilster (1997:1) defined DL as

“the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers”.

Many authors have attempted to define DL, but to date there is no clear definition of the concept, or clear guidelines on the usage of terminology (Hossain, 2014; Pokpas, 2014; Julien, 2015; Ilomäki, Paavola, Lakkala & Kantosalu, 2016; Chetty, Qigui, Gcoro, Josie, Wenwei & Fang, 2018). There are many types of literacy that fall under the DL umbrella: Information Literacy, Computer Literacy, Media Literacy, Communication Literacy, Visual Literacy and Technology Literacy (Hossain, 2014; Shopova, 2014; Julien, 2015). Stordy (2015) found 35 different types of literacies during his research and proposed that there is no clear definition for each type of literacy. The keywords from the many definitions for DL are: skills, knowledge, attitudes, using computers, critical reading, understand and create, ability to process and knowledge building (Hossain, 2014; Pokpas, 2014; Ilomäki et al., 2016).

There are numerous DL frameworks globally, with each one stating its own variations of terminologies and definitions for DL (Hall, Atkins & Fraser, 2014; Pokpas, 2014; Ilomäki et al., 2016). Pokpas (2014) studied the available frameworks but was unable to obtain a clear guideline regarding exactly which DL skills are necessary for the 21st century. She therefore developed a new conceptual framework of e-skills for digital inclusion (Pokpas, 2014). Eight competence components were identified: Basic, Technological, Information, Media, Communication and collaboration, Real-Time thinking, Creation of content and Transferable. The expected knowledge, skills and attitudes were specified for each of the eight components. This study has employed this theoretical framework to investigate the perceived DL competencies of ODL students in the EC province of SA.

In DE institutions, the lecturer is separated from the student geographically, there is little face to face interaction and technology is used for teaching and learning (Rangara, 2015; Kellen, da Silva & Behar, 2017). Unisa is a DE institution and refers

to itself as an ODL institution. ODL institutions offer students open access to education and training in terms of which the students have more flexibility regarding time, place and learning opportunities (Ghosh, Nath, Agarwal & Nath, 2012).

DT has transformed the way teaching and learning is conducted at ODL institutions. Some of the factors that contribute to the success of students at an ODL institution are their attitudes towards DT, the usage of the LMS, DL skills and the attendance of DL workshops (Mabila, Ssemugabi & Gelderblom, 2013; Honeychurch & McCluckie, 2014; Prior, Mazanov, Meacheam, Heaslip & Hanson, 2016; Ukwoma, Iwundu & Iwundu, 2016).

In an ODL environment, DL skills and attitudes of students contribute positively towards self-efficacy, which further has a positive impact on the interaction of the student with peers, LMS and the convener of the course (Mabila et al., 2013; Pokpas, 2014; Prior et al., 2016; Ukwoma et al., 2016). A study conducted at the University of Glasgow found that most students had a positive attitude towards DT for educational purposes and that technology enhances their learning (Honeychurch & McCluckie, 2014).

Students entering HE have different levels of DL skills (Ukwoma et al., 2016; Morgan, 2018). Some students might have no DL skills due to their socio-economic backgrounds and the inequalities that still exist (Pokpas, 2014). It is therefore imperative to have systems in place to identify which DL skills are lacking. Mabila et al. (2013) recommend that the ICT (Information and Communications Technology) skills of students entering the ODL institutions should be assessed so that appropriate training can be offered to students, to ensure that they have the required skills necessary to cope and be successful in the ODL environment and in the workplace.

The Department of Higher Education and Training (DHET), in its White paper for post-school education and training: Building an expanded, effective and integrated post-school system (South Africa. DHET, 2013), promotes ODL and Open Education Resources (OER) in the post-school sector as one of its key focus areas for 2013 – 2030. This implies that more students will be entering the ODL environment as lifelong learning is being encouraged. Providing the necessary DL skills to cope and be successful in the ODL environment has thus become an imperative objective for all HE institutions in SA.

Unisa, as the largest ODL institution in Africa, embraces the objectives of the White Paper and commits to harnessing “the new and emerging potential in information and communication technology to catapult the university into a truly digital future” (Unisa, 2019a).

1.3 RATIONALE FOR THE STUDY

The purpose of the regional offices at Unisa is to provide administrative and academic learner support services to students to promote graduateness. Graduatness entails the unique qualities, knowledge, skills and understanding that one gains upon successful completion of a qualification (Unisa, 2019e). The qualities acquired at universities should assist graduates personally, socially and in the work place. Chetwynd, Aiken and Jefferis (2018) explain that HE plays a vital role in producing global citizens by creating lifelong graduates.

To ensure that all students complete their qualifications successfully, providing academic and DT support to students is paramount for the regional offices at Unisa. At the regional offices, it is observed daily in the computer laboratories that some students do not have enough DL competency to use DT to enhance their learning experience. The outcomes of this study will provide the regional offices in the EC with a good understanding of the student profile in respect of their DL competencies.

This information can be used for determining the type of DL support programmes offered in the region which will meet the students' needs (Mabila et al., 2013).

This research therefore focuses on the perceived DL competencies of the Unisa ODL students in the EC province in SA.

1.4 STATEMENT OF THE PROBLEM

It has been observed that many students are still using manual systems. They wait for their printed tutorial letters to be delivered, complete their assignments by hand and submit their assignments manually at the regional offices. The assumption is that students either do not have access to DT or do not know how to use the DT.

DL training is important for the success of the students in an ODL environment and for acquiring basic life skills for the working world (Shopova, 2014; Ukwoma et al., 2016). Students may be able to use technology for social media, emails and games, however they might not have the correct skills and knowledge to use technology for learning and ultimately for the working world (Shopova, 2014; O'Connell & Dymment, 2016; European Computer Driving Licence (ECDL) Foundation, 2016; Gottipati, 2017).

It is the responsibility of HE institutions to prepare students for the world of work through graduateness, employability and DL. DL skills are required in the working world (South Africa. DHET, 2013; Julien, 2015; Van Jaarsveldt & Wessels, 2015). HE institutions are expected to provide ICT skills for the type of effective learning that is required in the working world (Van Jaarsveldt & Wessels, 2015). Ukwoma et al. (2016) further confirm that organisations employ individuals who are competent in the use of DT to perform their duties and who are active in the digital working world. HE institutions therefore face a challenge to produce graduates with the required 21st century DT skills to enhance their employability.

Observations and experience from a Unisa regional office in the EC province of SA have identified that there are many students who do not have any or have limited DL competencies. This poses a challenge to students and academic advancement opportunities. There is an urgent need to investigate their DL competencies with an aim to support students to improve their DL competencies.

This study was based on the e-skills for digital inclusion framework comprising the three main values of digital competence (DC): knowledge, skills and attitudes (Pokpas, 2014).

1.5 RESEARCH QUESTION

With reference to the above discussion, the following research question was formulated: **What are the perceived digital literacy competencies of Unisa's EC students?**

In addition, the following sub-questions were also addressed:

1. What are students' attitudes towards using DT for educational purposes?
2. To what extent do students use the Unisa LMS?
3. Do students attend DL workshops in the EC region?
4. Is there a statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies?
5. Is there a statistically significant relationship between students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies?

1.5.1 Purpose, aim and objectives of the study

The aim of this study was to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA in order to recommend appropriate and necessary training programmes.

This study sought to investigate the following objectives:

1. To determine students' attitudes towards using DT for educational purposes.
2. To investigate the extent to which students use the Unisa LMS.
3. To determine whether students attend regional DL workshops in the EC.
4. To examine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies.
5. To examine whether there is a statistically significant relationship between students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies.

The reason for investigating objective 4 above is to determine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics of the students, and the students' perceived DL competencies. The reason for investigating objective 5 above is to determine whether there is a statistically significant association/relationship between students' attitudes towards the use of DT for educational purposes, the usage of the LMS, attendance at regional DL workshops, and perceived DL competencies. The dependent variable is therefore the perceived DL competencies and the independent variables in the study are attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops.

1.5.2 Unit of analysis

The unit of analysis for empirical studies is referred to as the phenomenon that the researcher is interested in, upon which the study would be focused (Mouton, 2005; McMillan & Schumacher, 2010). For this study, the unit of analysis is all Unisa registered students in the EC.

1.5.3 Relationship of variables and hypotheses

Figure 1.1 below illustrates the possible relationships between the different variables of this study.

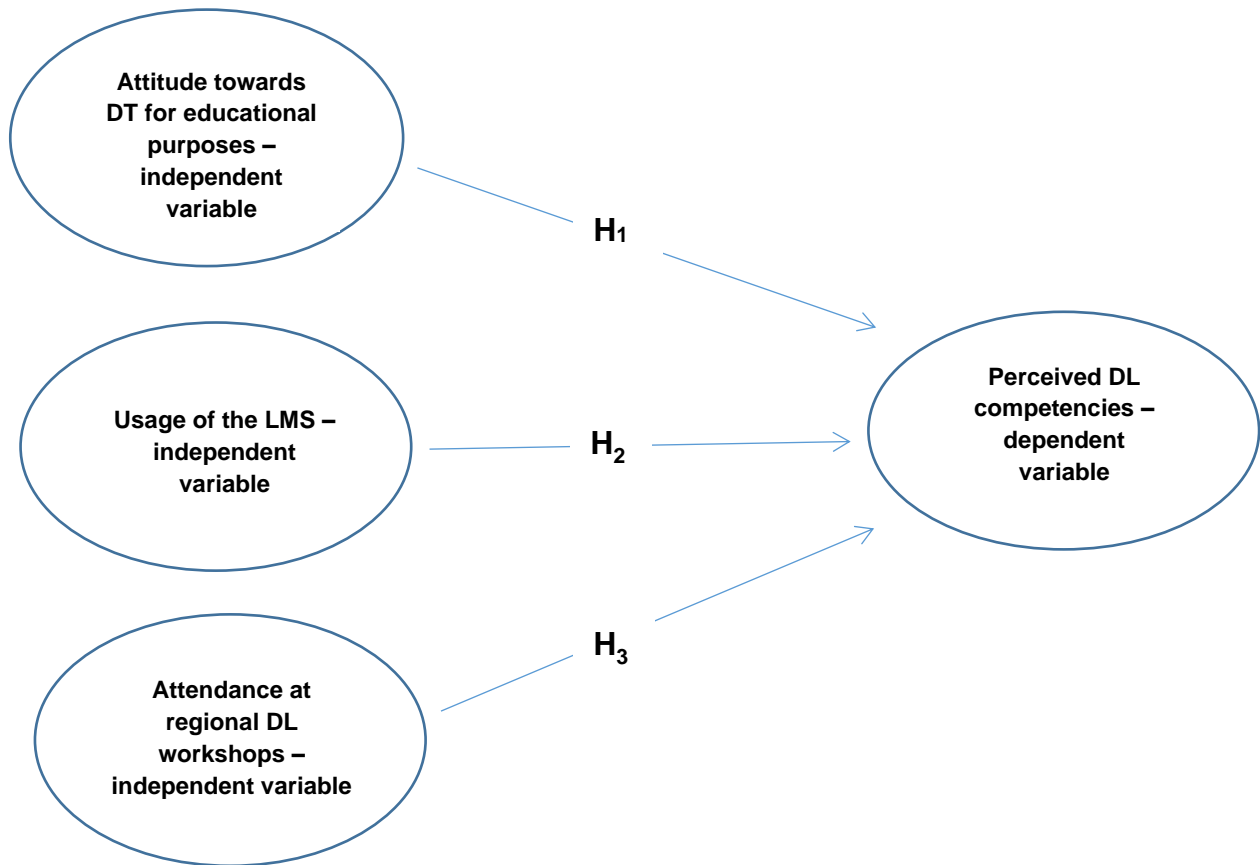


Figure 1.1: Possible relationships of variables used in this study (Source: Author)

Based on Figure 1.1 above, the following sets of hypotheses were tested and reported upon:

H1₀: There is no statistically significant relationship between attitudes towards DT for educational purposes and perceived DL competencies.

H1₁: There is a statistically significant relationship between attitudes towards DT for educational purposes and perceived DL competencies.

H2₀: There is no statistically significant relationship between the usage of the LMS and perceived DL competencies.

H2₁: There is a statistically significant relationship between the usage of the LMS and perceived DL competencies.

H3₀: There is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.

H3₁: There is a statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.

1.6 RESEARCH METHODOLOGY AND DESIGN

1.6.1 Research paradigm

A paradigm or worldview is determined by how the researcher views, believes or understands essential characteristics of life; it is the way the researcher sees the world (Maree, 2011). A researcher could see the world from a post-positivist, constructivist, transformative or pragmatism worldview (Creswell, 2014). The research methodology used in a study will be determined by the researcher's worldview.

The positivist paradigm was used for this study as it was best suited to meet the aim and objectives of this study. The positivist paradigm is employed when a researcher uses scientific methodology for the study: the researcher must be independent and must remain objective throughout the study (Maree, 2011; McMillan & Schumacher, 2010; Welman, Kruger & Mitchell, 2012). In order to remain objective and independent from the study during the data collection phase, the researcher had no interaction with the students. Upon completion of the data collection phase, the researcher analysed the collected data and reported the results in an objective and unbiased manner.

1.6.2 Research design

The research design is the overall plan of the study. It focuses on all the components that the researcher needs to follow to achieve the objectives of the study (Mouton, 2001; Saunders, Lewis & Thornhill, 2012; Welman et al., 2012). To achieve the aim and objectives of this study, a research design was formulated and is depicted in Figure 1.2 below.

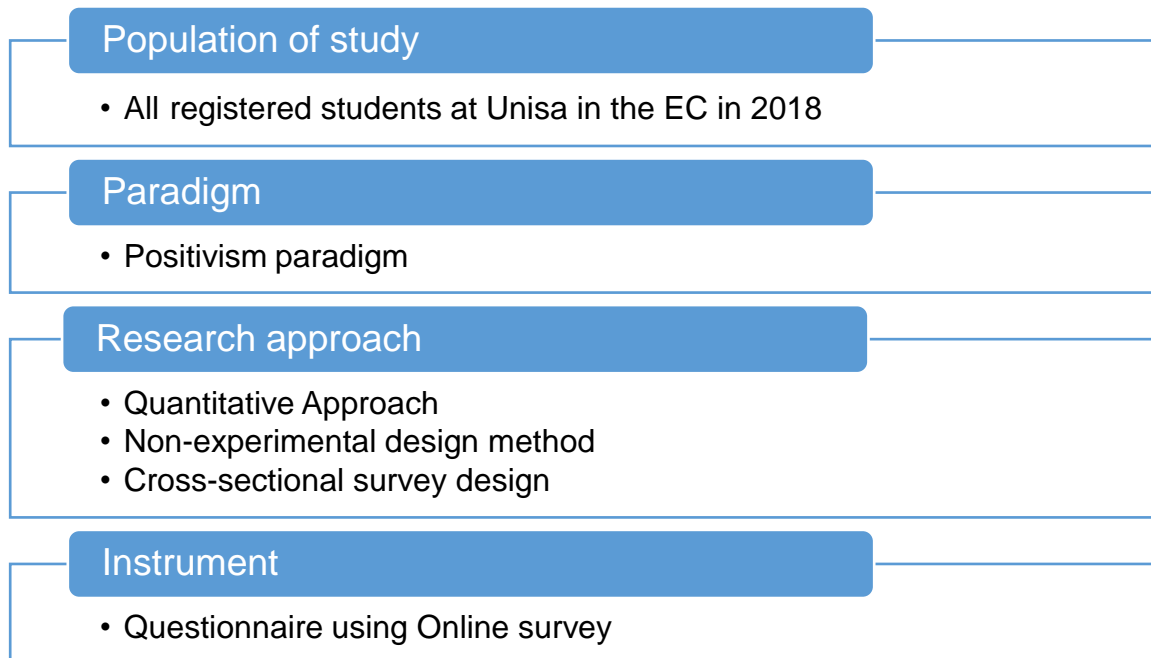


Figure 1.2: Research design (Source: Author)

All components of the design as illustrated in Figure 1.2 will be discussed briefly below and then in more detail in Chapter 3.

1.6.3 Research approach

The research approach consists of the plans and detailed methods that the researcher would follow to collect, analyse and interpret the data (Creswell, 2014). There are three types of research approach that can be used for research, namely qualitative, quantitative and mixed methods. This study used the quantitative research approach. This approach is used to examine relationships between variables and statistical procedures are used to analyse the data (Creswell, 2014). The approach chosen supports the aim and objectives of this study where the researcher could objectively collect data, statistically analyse the data and determine whether there was any statistically significant association(s) and relationship between the variables.

1.6.4 Quantitative research approach

Experimental and non-experimental design methods are two types of quantitative research design. This study followed the non-experimental design. The non-experimental design allows the researcher to investigate the identified environment and examine the relationships within the environment. The researcher does not interfere with the conditions of the environment (McMillan & Schumacher, 2010). The non-experimental design was best suited for this study as the researcher was able to obtain data objectively from the participants and to analyse the data to determine the statistical relationship between the variables. This design allowed the researcher to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA.

Cross-sectional survey design is a type of non-experimental design. Cross-sectional survey research design provides an opportunity for the researcher to gather data on a variable or several variables at the same time (Collis & Hussey, 2009; McMillan & Schumacher, 2010; Welman et al., 2012; Saunders et al., 2012). To achieve the aims and objectives of the study, a cross-sectional survey design was followed, and an online questionnaire was used as a collection instrument. The online questionnaire enabled the researcher to obtain information directly from the all participants at one time in an unbiased manner.

1.6.5 Population and sampling

A population is defined as “the full set of cases from which a sample is taken” (Welman et al., 2012:53; Saunders et al., 2012:260). McMillan and Schumacher (2010) further define population as the entire interest group that meets the criteria set by the researcher for the study. The full group of cases is referred to as the target population (McMillan & Schumacher, 2010).

Unisa has three regional offices in the EC: East London, Port Elizabeth and Mthatha, with a student population of 16 983 students registered in 2018 (Unisa, 2019b). The target population for this study is therefore 16 983 students, comprising all students who were registered in 2018 for both formal and non-formal qualifications at Unisa in the EC.

A sample is a group of individuals who represent the target population, from which the data is collected for the study (McMillan & Schumacher, 2010). Welman et al. (2012) further explain that the sample represents the target population by having the similar properties of the population and is used when it is not practically and/or economically feasible to conduct research on an entire population.

Census sampling is when the entire target population is used for the study (Bryman, Bell, Hirshsohn, Dos Santos, Du Toit, Masenge, Van Aardt & Wagner, 2014; Saunders et al., 2012).

For this study, the researcher used the census method as the entire target population was accessible, there were no financial implications and a greater response rate was expected. One of the disadvantages of online surveys is the low response rate from participants (McMillan & Schumacher, 2010).

1.6.6 Instrumentation and data collection techniques

To conduct this study, an online survey tool was used to gather information from the participants. An online survey tool uses the Internet to create the questionnaire, to send the questionnaire and to receive the responses from the participants (McMillan & Schumacher, 2010). Based on the eight competencies of the e-skills digital inclusion framework (Pokpas, 2014; see Appendix A), the researcher created a new online questionnaire to meet the aim and objectives of the study (see Appendix B). The questionnaire consisted of six sections: Section A: Demographics; Section B:

DL competencies; Section C: Attitude towards DT for educational purposes; Section D: Access to technology; Section E: Usage of the LMS; and Section F: Attendance at regional DL workshops. The online survey was assessed by the supervisor and statistician for correctness, face validity and reliability.

The Survey Monkey software program was used as the online survey tool. Survey Monkey allowed the researcher to create the questionnaire and to collect the data online. The Unisa ICT department emailed the online survey link to all participants of the study using their Unisa student email address (myLife). The survey was conducted over a six-week period. A reminder email was sent after two weeks as the response rate was low. A low response rate is a known disadvantage of online surveys (McMillan & Schumacher, 2010). The response rate had however improved to an acceptable level after the second email invitation was sent to all the students. The data collected was exported to the Statistical Package for Social Science (SPSS) program for statistical data analysis. The SPSS program is designed to perform comprehensive inferential statistical analyses (Mouton, 2005; McMillan & Schumacher, 2010).

Upon receipt of the ethical clearance certificate and permission to conduct research at Unisa (see Appendices C and D), a pilot study was conducted to test the questionnaire. A pilot study is conducted prior to the actual study, to test the questionnaire for possible flaws and to test for unclear or ambiguous items (Welman et al., 2012). The pilot study assisted the researcher to validate the content scoring, to improve the questions, format the scales and to measure the approximate time that would be required for the questionnaire (McMillan & Schumacher, 2010; Creswell, 2014). A sample of 26 participants was used for the pilot study. The data collected during the pilot study was analysed by the researcher and the statistician. Errors were identified and adjustments were made to the questionnaire. The survey was then retested by the researcher, supervisor and statistician. Final adjustments

were made to the questionnaire before the final survey was sent out to the participants.

1.6.7 Data analysis

Data analysis entails sorting the collected data into meaningful themes, patterns, trends and relationships so that an understanding of the various elements of the data can be established (Mouton, 2005).

The collected data was exported from the Survey Monkey program into the SPSS program. Data was drawn from the SPSS program for the purpose of statistical analysis on the socio-demographic characteristics, academic characteristics of the participants, perceived DL competencies, attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops. The descriptive statistics are presented in the form of graphs and tables.

Inferential statistical analysis, using Pearson's Chi-squared test (Field, 2013), was used to determine the association(s) between the socio-demographic and academic characteristics of the participants and the perceived DL competencies.

To test the hypotheses, Kendall's tau non-parametric correlation coefficient (Field, 2013) was used to test the strength and direction of association between the dependent variable, perceived DL competencies and independent variables: attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops.

1.7 QUALITY MEASURES

1.7.1 Validity

Validity and reliability are concepts used to evaluate the quality of research: these concepts were therefore utilised to ensure that the instruments used in the research were of high standard (McMillan & Schumacher, 2010; Saunders et al., 2012). The validity and reliability of instruments are crucial aspects in quantitative research (Maree, 2011).

Welman et al. (2012) explain that measuring validity ensures that the research produces results that truly represent the population. McMillan and Schumacher (2010) further explain that validity refers to the degree to which the research instrument used in the study measures what it sets out to measure. To ensure that the research produces trustworthy results, internal and external validity checks can be performed. Internal validity refers to the control measures of the variables in the study. External validity refers to how the results can be generalised to the population or to real life (Maree, 2011). There are different types of validity checks: face validity, content validity, criterion validity and construct validity (Flick, 2011; Maree, 2011; Creswell, 2014).

To test the validity of the questionnaire, face validity and content validity tests were conducted. For face validity, staff and students tested the questionnaire during the pilot study to assess whether the questions were clear and relevant and to measure the time taken to complete the questionnaire. The supervisor and the statistician conducted the content validity to ensure that all the questions were aligned to the research objectives and that there were sufficient questions that would meet each research objective (McMillan & Schumacher, 2010; Maree, 2011; Flick, 2011).

1.7.2 Reliability

Testing reliability ensures that the instrument produces consistent results and that the findings of one's research are reliable. Reliability refers to the consistency of the results using the same instrument over a period of time on the same sample, or using the same instrument and method by a different researcher (McMillan & Schumacher, 2010; Maree; 2011; Saunders et al., 2012). There are four types of reliability: test-retest reliability, equivalent form reliability, split-half reliability and internal reliability (Maree, 2011).

To ensure that the online questionnaire used for this study was reliable, an internal consistency test was used. Internal consistency measures the consistency of the responses to the questions in the questionnaire (Saunders et al., 2012). The Cronbach's alpha coefficient is used to determine the consistency of items measuring a single variable (McMillan & Schumacher, 2010). Acceptable results for Cronbach's alpha coefficient is > 0.7 (McMillan & Schumacher, 2010; Bryman et al., 2014; Saunders et al., 2012). The SPSS program was used to perform a reliability test of the questionnaire. The reliability test indicated that all the variables: perceived DL competencies, attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops, had a Cronbach's alpha value above 0.70 which indicates that the questionnaire used was reliable.

1.8 Ethical considerations

Research ethics are the principles and procedures that are followed whilst conducting the research (Saunders et al., 2012). To ensure that the study is conducted ethically, the researcher must ensure that all ethical principles are adhered to throughout the study (McMillan & Schumacher, 2010). Some of the principles of ethics that the researcher needs to adhere to are full disclosure, voluntary participation, informed consent, no harm or risk to participants and privacy (McMillan & Schumacher, 2010).

The researcher was guided by and complied with the Policy of Research Ethics of Unisa (Unisa, 2016) to ensure that the study was conducted in an ethical manner. The researcher ensured that the research was in line with the international moral principles as stated in the policy: autonomy of participants, beneficence of the study, non-maleficence towards participants and people in general, and justice.

In adherence to the Policy of Research Ethics of Unisa (Unisa, 2016), no data was collected before the receipt of the ethical clearance certificate and the Research Permission Approval (see Appendices C and D). Privacy, anonymity and confidentiality as per the Policy of Research Ethics of Unisa were adhered to throughout the research process.

1.9 LIMITATIONS AND DELIMITATIONS OF THE STUDY

The scope of this study was limited to the students registered in the EC region only as the aim of the study was to recommend DL training programmes to the EC regional offices based on the needs identified by the research.

This study used an online survey. The link to the survey was sent to the students' Unisa email addresses. Students who do not use such DT or who did not open their emails within the duration of the study, did not participate in the study. This implies that this study does not represent the entire population but only represents students who use DT and students who have access to their emails.

The survey asked questions which required self-assessment responses. The data collected might not be a true reflection of the DL competencies of the participants as with self-assessment questions, participants tend to overestimate their abilities, being willing to perform better or trying to impress the reader (ECDL Foundation, 2016). In future studies, an objective performance test should be conducted to test the actual DL competencies of students to avoid self-evaluation bias.

1.10 DEFINITION OF KEY CONCEPTS

Digital Literacy (DL)

The term DL was first introduced in the late 1990s as “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers” (Gilster,1997:1). Gilster (1997) further explained that literacy is not just a matter of reading, but a matter of reading with understanding. The core competence for DL identified by Gilster (1997) was 1) the ability to make informed judgements on the information found online; 2) the ability to think critically; 3) the ability to create content from the information retrieved; and 4) the ability to find relevant information. Over the years, due to the increased usage of computers and the change in the needs of society and the workplace, many authors have adjusted the definition of DL to suit their context or their need (Karpati, 2011; Pokpas, 2014; Chetty et al., 2018). No clear or definite definition of DL could be found (Hossain, 2014; Pokpas, 2014; Julien, 2015; Buckingham, 2015; Ilomäki et al., 2016; Chetty et al., 2018). Numerous authors have given different definitions and used different terminologies for the term DL (Pokpas, 2014; Ilomäki et al., 2016). Buckingham (2015) explains that the functional definition of DL is a minimal set of skills that is required to use the software tools effectively, or to be able to perform tasks to retrieve information. Buckingham (2015) further explains that DL is far more than merely knowing how to use digital tools for information retrieval. Julien (2015:2141) defines DL as a “set of skills, knowledge and attitudes required to access digital information effectively, efficiently, and ethically”, while Njenga (2018) argues that the definition of DL should include the contextual aspects, the use of digital technologies and the critical aspects of learning.

DL is an umbrella term used internationally which consists of various literacies: media literacy, technology literacy, information literacy, computer literacy, visual literacy, communication literacy and social literacy (Karpati, 2011; Hossain, 2014;

Shopova, 2014; Julien, 2015; Ozdamar-Keskin, Ozata, Banar & Royle, 2015). Figure 1.3 below graphically illustrates some of the various types of DL identified by literature.

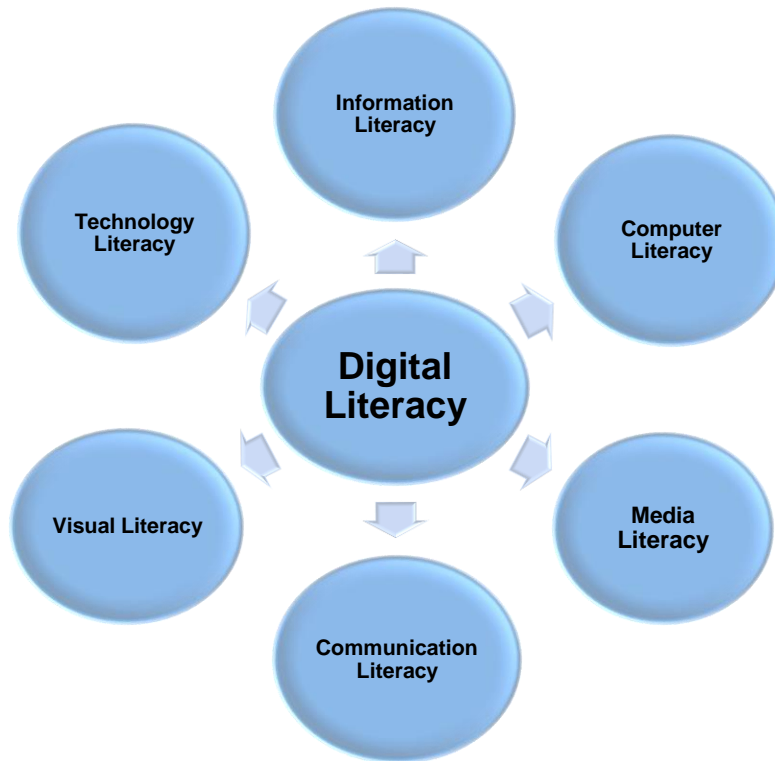


Figure 1.3: Types of Digital Literacies (Source: Author)

For the purpose of this study, the researcher views DL as a set of competencies required to use the various digital software tools effectively, efficiently and responsibly to actively engage in the educational, social and economic environment. A few examples of digital software tools are social media platforms, specialised programs, word processing, spreadsheets, databases, emails, internet.

Open Distance Learning (ODL)

An ODL environment adopts the principles of student centredness, promotes lifelong learning, the needs of students, recognition of prior learning, flexibility of learning,

and has a provision for student support (Council of Higher Education, 2014). An ODL environment enables a student to study irrespective of his/her geographical location or work commitments. The student has the flexibility of determining his/her own learning experience with regard to his pace, place and time.

Distance education provides learning opportunities to students where the learning programme is designed in a manner according to which the student experiences teaching, learning, support and assessment whilst not being physically on the institution's premises (Council of Higher Education, 2014).

Unisa defines ODL as:

a multi-dimensional concept aimed at bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware and student and peers. Open distance e-learning focuses on removing barriers to access learning, flexibility of learning provision, student-centredness, supporting students and constructing learning programmes with the expectation that students can succeed (Unisa, 2018a:2).

Unisa is the “is the largest open distance learning institution in Africa and the longest standing dedicated distance education university in the world” (Unisa, 2019a). The institution was founded in 1873 and has a current student population of approximately 382 000 students. Students can enrol for a range of studies, from short informal courses to formal qualifications (Unisa, 2019a). Unisa has regional centres in the following regions in SA: Eastern Cape, Gauteng, KwaZulu-Natal, North Eastern, Midlands and Western Cape (Unisa, 2019g).

Eastern Cape

The Eastern Cape is a province in SA with a population of approximately 6,6 million people (South Africa, 2019a). It is the second largest province in SA and spans over 169 580 m² (Eastern Cape Development Corporation, 2019). The unemployment rate for the second quarter of 2019 for the EC was 35.4% (South Africa, 2019b).

The SA National Census conducted in 2011 indicated that the O.R. Tambo district had the largest proportion of the EC population with 20.8% and UKhahlamba district with the lowest proportion of the population of 5.3% (South Africa, 2011). The main languages spoken in the EC province are Xhosa (78%), Afrikaans (10%) and English (5%) (Eastern Cape Development Corporation, 2019).

Unisa has three regional offices in the province: East London, Port Elizabeth and Mthatha. The East London office, which is called the regional hub, is the main office in the EC province.

Higher education

Higher education institutions are public and private institutions in SA that offer post school qualifications from Higher Certificates to Doctoral degrees (South Africa, 2007). The Department of Education has a National Qualifications Framework (NQF) policy that regulates all HE institutions in SA. The aim of the NQF policy is to provide:

the basis for integrating all higher education qualifications into the National Qualifications Framework (NQF) and its structures for standards generation and quality assurance. It improves the coherence of the higher education system and facilitates the articulation of qualifications, thereby enhancing the flexibility of the system and enabling students to move more efficiently over

time from one programme to another as they pursue their academic or professional careers (South Africa, 2007:5).

There are 26 public HE institutions in SA (South Africa, 2020).

Fourth Industrial Revolution (4IR)

A revolution is defined as “a big change or improvement in the way that something works or looks, or in the way that people do a particular activity” (Dictionary.cambridge). The DT industry has transformed drastically since its first introduction in 1960s and has gained momentum in recent years.

The 4IR introduces new technology which fuses the physical, digital and biological worlds. Some examples of new technologies introduced are artificial intelligence, internet of things, augmented reality, 3D printing, robotics and cloud computing, to name a few (Schwab, 2016). All sectors of industry, including education are affected by the introduction of 4IR and therefore it is imperative that all sectors are kept abreast of the emerging technologies as it will affect the way we learn and work (Schwab, 2016).

1.11 CHAPTER OUTLINE

Chapter 1: Introduction

Chapter 1 provided the overview of the study. This chapter included the background to the research problem, the rationale of the study, the problem statement, the research question, the research aim and objectives, the conceptual framework and the hypotheses, the research methodology and design, the limitations and delimitations, definitions of key concepts and a brief chapter overview.

Chapter 2: Literature review

This chapter consists of an in-depth analysis of what other authors have written about this field of study and indicates gaps that were identified in the literature.

Chapter 3: Research design and methodology

The research design and methodology used for the research are explained in detail, in Chapter 3, including the techniques and tools used and the procedures followed to obtain the data. Ethical considerations are also included in this chapter.

Chapter 4: Data analysis and presentation of results

The data collection, data analysis and the findings of the research are presented and discussed in Chapter 4. The results of the questionnaire are presented in different formats: tables and graphs.

Chapter 5: Conclusion and recommendations

This chapter covers an in-depth explanation of the results, compares results to existing literature, and includes a discussion on limitations and delimitations of the study. Recommendations emanating from the study are also presented.

1.12 CONCLUSION

Chapter 1 has introduced the topic of the study and has explained how the study was conducted. This chapter discussed the introduction and background, the rationale and problem statement of the study. The conceptual framework and the hypotheses used for this study were presented. The chapter further introduced the research paradigm, methodology and design that were used for the study. The limitations and delimitations were mentioned, and definitions of the key concepts were provided. The subsequent chapters were briefly outlined. Chapter 2 will discuss the literature review relevant to the research.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 2 presents the review of literature relevant to the scope of this study on the perceived DL competencies of ODL students in the EC province in SA.

This chapter contains a discussion of the literature reviewed on the key concepts and the variables that were used in this study: DC, DL, DL frameworks, ODL, 21st century skills, fourth industrial revolution, attitude towards DT for educational purposes, learner management system and DL training programmes.

2.2 DIGITAL COMPETENCE

The term digital competence (DC) was introduced in 2010 and may be used synonymously with the term digital literacy (DL) (Spante, Hashemi, Lundin & Algers, 2018). Many scholars have defined and interpreted DC differently as a result of their different viewpoints (Ferrari, 2012; Ilomäki et al., 2016; Kellen et al., 2017) and therefore no standard definition was formulated. Ilomäki et al. (2016) explain that one of the reasons for not having a standard definition or understanding of DC is the dynamic nature of ICT and the changing needs of society.

From the various pieces of literature reviewed, Ferrari (2012), after analysing numerous DC frameworks, views DC as a set of various competencies (knowledge, skills, attitudes, abilities, strategies and awareness) that a user would require in order to use ICT to perform a variety of tasks for personal, social, education or economic purposes.

Similarly, in an attempt to construct a clear definition of DC, Ilomäki et al. (2016) analysed 76 education research articles related to DC. The study concluded that DC comes from a wide background and therefore has a wide scope consisting of several skills and competences, and proposed the following definition for DC (Ilomäki et al., 2016:670-671):

Digital competence consists of the skills and practices required to use new technologies in a meaningful way and as a tool for learning, working and leisure time, understanding the essential phenomena of digital technologies in society as well as on one's own life, and the motivation to participate in the digital world as an active and responsible actor.

To differentiate between the terms DL and DC, a systematic review of 107 peer reviewed articles were studied by Spante et al. (2018) on the usage of the terms DL and DC in policies and research in HE from 1997 to 2017. They reported that, while the term DL was first introduced in 1997, the term DC was first introduced in 2010; and that both terminologies are still being used currently. Both terms are used in publications with no clear definition for either one, and in some instances the two terms are used interchangeably. The term digital competency was defined mainly in policy documents. The study further showed that English speaking countries (United Kingdom and United States of America) conducted studies on DL and that the European countries that were outside the United Kingdom (Spain, Italy and Scandinavia) conducted studies on DC (Spante et al., 2018).

Further studies were conducted by Kluzer and Priego (2018), who confirm the diversity of the definitions of DC and who define DC as an ability to use digital technologies critically, collaboratively and creatively in daily activities for personal, social and in the working environment.

To obtain a clear definition of DC is not a simple task as each author referred to above has a variation of similar components in his/her definition of DC. Scholars have further refined the definition for DC to be a combination of knowledge, skills and attitudes appropriate to the context and supported by the appropriate digital resources and technology tools (Pokpas, 2014; Kellen et al., 2017).

From the literature reviewed above, all authors share similar views on the key elements of DC which comprises the skills, knowledge and attitudes that are required to use DT efficiently, effectively, critically, creatively and ethically for social, educational, economic purposes, as well as in the workplace. For the purpose of this study, the researcher views DC as a combination of knowledge, skills and attitudes towards using DT in an educational, social, economic and workplace environment.

2.3 DIGITAL LITERACY

Digital literacy is a vital skill for the success of students studying at an ODL institution (Maphosa & Bhebhe, 2019) due to the increase in the use of ICT in ODL institutions.

Gilster (1997) was the first to introduce and define the term DL in the late 1990s as “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers” (Gilster, 1997:1). The core competencies for DL identified by Gilster (1997) as mentioned in Chapter 1, are: the ability to make informed judgement, think critically, create content and find relevant information.

Since Gilster’s (1997) first definition of DL, many authors have adjusted the definition of DL to suit their context in terms of the usage of computers as the demand of society and workplace has changed (Hossain, 2014; Pokpas, 2014; Julien, 2015; Buckingham, 2015; Ilomäki et al., 2016; Chetty et al., 2018).

Alfonzo and Batson (2014) view DL as a composition of a variety of skills which includes the usage of software applications, management of digital information and usage of search engines. Julien (2015) further defines DL as a set of skills, knowledge and attitudes that will be required for effectively, efficiently and ethically accessing digital information. Maphosa and Bhebhe (2019) further add that DL is the ability use ICT to find, evaluate, utilise, share and create information that is found online.

Literature has shown that the term and understanding of DL has evolved over the years and that DL has now become an umbrella term used internationally which consists of various combinations of skills, characteristics or literacies. Some of the literacies are: media literacy, technology literacy, information literacy, computer literacy, visual literacy, communication literacy and social literacy (Karpati, 2011; Hossain, 2014; Shopova, 2014; Julien, 2015; Ozdamar-Keskin et al., 2015; Alexander, Adams Becker, Cummins & Hall Giesinger, 2017). Figure 1.3 in Chapter 1 graphically depicts some of the various types of literacies of DL identified by the literature.

There is no clear guideline on the composition of literacies for DL, or as to what exactly each type of literacy entails (Chetty et al., 2018). Chetty et al. (2018) state that each country has its own definition or interpretation based on the needs or skills focus of the country. Alexander et al. (2017) support this view and add that based on the local situations, nations and regions are cutting across the various literacies of DL and moving towards empowering their learners and users to become digital creators.

In an attempt to obtain an understanding and to assimilate the various literacy types, Stordy (2015) reviewed 685 studies and identified about 35 different literacies related to ICT from the studies that were reviewed. No clear terminology or definition could be found due to the variations on the usage of new technologies, the new ways of

thinking about literacies and increase of cognitive abilities. Stordy (2015), based on his study, proposed that literacies are the abilities of individuals or social groups that are required to produce meaningful content using DT within a learning, social or work-related environment. This definition captures the common elements found in most DL definitions: usage of technology, the cognitive ability to create content and a social interaction and is in line with Gilster's (1997) initial definition of DL.

The proposed definition of DL by Stordy (2015) is supported by lordache, Mariën and Baelden (2017), who conducted a quick scan analysis which enabled them to cross-case explore 13 DL models in the period from 2004 to 2014, with the aim to identify, analyse and understand the concepts of digital skills, literacies and competences. A quick scan analysis allowed the researcher to examine various case studies over a period based on a set of predetermined variables (lordache et al., 2017). Studying the 13 DL frameworks, 39 skills/competencies known as indicators were identified. Table 2.1 highlights the DL skills and competences that were mentioned in more than 11 models across the 13 identified DL frameworks under the various categories.

Table 2.1: Summary of the most common DL skills and competencies

CATEGORY	DIGITAL SKILLS AND COMPETENCIES
Operational, technical and formal	<ul style="list-style-type: none"> ▪ Knowing and using hardware ▪ Knowing and using digital tools and software ▪ Knowing and using the Internet
Information and cognition	<ul style="list-style-type: none"> ▪ Analyse and evaluate ▪ Search ▪ Identify/select ▪ Locate ▪ Disseminate/share
Digital communication	<ul style="list-style-type: none"> ▪ Construct messages ▪ Understand messages ▪ Exchange messages/share content ▪ Interact/collaborate online ▪ Netiquette ▪ Encode/decode messages
Digital content creation	<ul style="list-style-type: none"> ▪ Create and edit new content/construct new knowledge ▪ Produce creative expressions

(Source: Adapted from lordache et al., 2017:28)

Alexander et al. (2017) produced similar findings and stated that the key elements of DL are communication, critical thinking, technical skills and content creation where the most common elements identified.

Spante et al. (2018) derived from their study that the term DL, similar to the terms media literacy and computer literacy, was originally understood to be skill-based and relates to the operational use of technology. Spante et al. (2018) additionally suggest that authors have recently included the terms cognitive skills and competences into the definition of DL.

To alleviate the confusion and variations in the definitions and interpretations of the concept of DL and to ensure that all countries are standardised internationally, Chetty et al. (2018) proposed that the definition for DL be standardised for data collection, measurement and international benchmarking purposes. The proposal supports the mindset that DL training programmes should not only concentrate on technical operations but should include awareness of cognitive and ethical concerns. This will assist the individual to be able to analyse, evaluate, create new content and to be able to cope in the fast-evolving workplace. The proposal of a standardised definition and framework for measurement is supported as it will assist training providers with what needs to be taught and assessed (Lyons, Kass-Hanna, Zucchetti & Cobo, 2019). Acquiring the appropriate skills and knowledge will assist individuals in seeking future employment as their training will be in line with the required skills for future years: higher cognitive skills, social and emotional skills and technological skills as suggested by Bughin, Hazan, Lund, Dahlström, Wiesinger and Subramaniam (2018).

After reading various pieces of literature and from the above discussions, it was found that, as with DC, DL could not be clearly defined. Authors have viewed DL as a combination of various literacies from basic skills to cognitive skills, which will enable the user to use DT to perform tasks. For the purpose of this study, and based on the literature reviewed, the researcher views DL as a combination of literacies required to use the various components of DT effectively, efficiently and responsibly to actively engage in the educational, social, economic and workplace environment.

2.4 DIGITAL LITERACY FRAMEWORKS

Like DC and DL, there are numerous DL frameworks globally, with each one stating its own variations of terminologies, definitions for DL and set of skills (Hall et al., 2014; Pokpas, 2014; Ilomäki et al., 2016; Alexander et al., 2017; Chetty et al., 2018). Some frameworks are based on the theory that DL is a lifelong practice as opposed to other frameworks that follow the theory that DL is a fixed set of skills (Alexander et al., 2017). DL frameworks are revised regularly as the skills and competency demands of the workforce are evolving beyond the 21st century skills and moving towards the Fourth Industrial Revolution (4IR) and beyond. Based on the McKinsey Global Institute workforce skills model, Bughin et al. (2018) explain that by 2030 there will be a decline in demand for physical, manual skills and basic cognitive skills and an increase in demand for higher cognitive skills, social and emotional skills and technological skills. The shift towards requiring more high-level cognitive skills for the workplace is supported by Alexander et al. (2017).

The skills needed in the workplace are continuously evolving at a rapid pace. This creates a need for students to cultivate a culture of lifelong learning, to continuously master new skills and to learn to become adaptable to the new ICT (Alexander et al., 2017). Students with only basic DL competencies will not cope in the working world as the demands of the workplace are moving towards the demand for high cognitive skills in preparation for 4IR and beyond.

In an attempt to understand the DL frameworks, Alexander et al. (2017) report, from the 11 DL frameworks studied, that it is evident that each DL framework has a different emphasis and different priorities. The study found that DL frameworks differ per country depending on the country's needs and focus. In the United States, the DL frameworks focus on education policies and on personal empowerment, in terms of which students are encouraged to use DT effectively and creatively in the education, social and economic environments. In Europe, the emphasis is more on

media literacy and content creation due to an increase in discussions on representing refugees and the new populism. In the Middle East, media literacy is the focus point of DL due to an initiative to produce content that is locally sourced. In Africa, due to the uneven development of the different countries within Africa, the DL focus is on ICT skills, job skills and digital entrepreneurship and therefore the emphasis for DL is more focused on acquiring skills to cope in the business sector (Alexander et al., 2017).

Alexander et al. (2017) conclude that the different frameworks consist of a combination of skills and characteristics and that there is no standard skill or approach for DL frameworks across the globe. However, the different DL frameworks do share common characteristics: communication, critical thinking, technical skills, content creation, civics and citizenship. A few frameworks include copyright law as part of the DL framework.

Further studies were conducted by Kellen et al. (2017) in order to develop a new DC model for distance learning students, which is called the CompDigAL_EAD model. Kellen et al. (2017) studied 14 different DL frameworks from the period 1996 to 2013 and confirmed similar findings to those of Alexander et al. (2017), where there was no uniformity and a huge diversity in standards and terminology. Keeping the distance learner in mind, the CompDigAL_EAD model consists of the following competencies: use of a computer, the Internet and online communications, communication, information management, creation and development of digital content, virtual profile management and online attendance. The pattern of common elements found in other DL frameworks discussed above are also present in this framework: communications, critical thinking, technology skills and content creation.

Another framework called the DigComp, the European Digital Competence Framework, is a reference user guide to assist users on how to become digitally competent so that they can become successful in the workplace and society. The

European Digital Competence Framework has 21 competence areas grouped into 5 categories or dimensions that are needed for an individual to be digitally competent (Kluzer & Priego, 2018) (see Table 2.2). The competence areas are similar to those of previously discussed frameworks.

Table 2.2: DigComp competence areas and competences

COMPETENCE AREAS	COMPETENCES
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
2. Communication and collaboration	2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity
3. Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licences 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

(Source: Kluzer & Priego, 2018:12)

Based on the literature reviewed, it is noteworthy that there are numerous DL frameworks and each DL framework has a different combination of competencies. The variation on the combination of the competencies within the different DL frameworks is based on different priorities and focus areas (Alexander et al., 2017).

To ensure that globally all citizens of all ages and socioeconomic backgrounds are fully equipped for the current and future ICT driven workforce, Lyons et al. (2019) submitted a recommendation to the Group of Twenty (G20) summit of 2019 to develop and support an international digital skills strategy. The G20 is an international committee that addresses international policies and frameworks for global economic growth (G20, 2019) and is a well-positioned platform to discuss global frameworks and policies (Chetty et al., 2018; Lyons et al., 2019). It was recommended that the international digital skills strategy should have a standardised DL definition, DL framework and the assessment tools to measure DL skills that will assist in meeting the DL skills requirements of business and industry. This proposal formalises the proposal of Chetty et al. (2018) to standardise the definition of DL for data collection, measurement and international benchmarking purposes. Over the past few years, the G20 has played a fundamental role in creating awareness regarding the importance of obtaining relevant digital skills and supporting a move towards a global educational framework (Chetty et al., 2018; Lyons et al., 2019).

The recommendation by Lyons et al. (2019) to standardise the DL definition, DL framework and assessment tool to measure DL skills is aimed at assisting both the education field and industry globally. The standardisation will additionally assist and guide education institutions to ensure that students are adequately prepared for the high demand of DL skills required by industry. The recommendation is motivated by the many challenges currently being experienced in society and in the workforce. Some of the challenges are, for example, the digitally divided society; the international DT imbalance, both infrastructurally and in terms of access; the fact that DL skills taught at school and HE are not in line with the needs of the fast-

evolving workplace; the lack of appropriately advanced DL skills for the current and future workforce; and the fact that the importance of soft skills being included into the DL framework is not well understood. The soft skills to be included in the framework are critical and innovative thinking, complex problem solving, communication and the ability to collaborate. It is recommended that the DL definition and framework should include soft skills and higher order cognitive digital skills over and above the technical skills (Lyons et al., 2019). It was further recommended that the standardised DL definition, DL framework and DL assessment tool should be reviewed on a regular basis to ensure that they are in line with the changes and advancements of industry (Chetty et al., 2018; Lyons et al., 2019).

The task is huge and has many challenges; however, with cooperation from all countries, it is within the bounds of possibility that a standardised DL framework can be achieved. One benefit would be that each institution, organisation and country would be able to identify its gaps and work towards systems to bridge those gaps. Another advantage of standardisation is that all citizens would be able to compete globally in the workplace.

The literature reviewed above has shown that there are many DL frameworks which consist of various elements: technical skills, communication, content creation, critical thinking, lifelong learning, citizenship, information management, media, safety, problem solving and many other elements. Most of the DL frameworks have the core elements and some have additional elements to accommodate the context in which the framework was developed. For the purpose of this study, the DL framework of Pokpas (2014) was used as it is best suited in a South African context where the focus of DL is on technology skills and job skills (Alexander et al., 2017).

Pokpas (2014) studied the available frameworks and was unable to obtain a clear guideline on which DL skills are necessary for the 21st century. A new conceptual

framework was developed of e-skills for the digital inclusion (Pokpas, 2014) (see Appendix A). Eight competence components were identified: basic, technological, information, media, communication and collaboration, real-time thinking, creation of content and transferable. The expected knowledge, skills and attitudes were specified for each of the eight components.

The eight competence components as conceptualised by Pokpas (2014) (see Appendix A) are briefly summarised in Table 2.3.

Table 2.3: E-skills for digital inclusion digital competencies

COMPONENTS	COMPETENCE
1. Basic competences	Reading, writing, numeracy skills and the usage of these skills in the ICT environment are regarded as basic competences. These skills are also referred to as the fundamental skills that one needs to be able to use ICT effectively and to be able to function in society.
2. Technological competences <i>2.1. Operational skills</i>	Operating skills are the basic technical skills required to use technology. The operating skills “consists of the ability to interact with hardware, software, networks and various communication devices, understanding the context and purpose of use of the medium” (Pokpas, 2014:184).
<i>2.2. Navigation skills</i>	These are the knowledge, understanding and usage of the Internet. One is expected to have the skills to navigate through the Internet and to obtain the desired outcomes in the shortest period especially if finance and access to technology is limited.
<i>2.3. Security skills</i>	Security skills are the knowledge and understanding of the importance of adhering to safety measures when using technology especially with the use of the Internet. The ability and skill to use safety measures when using technology to ensure that personal information, hardware and software is protected.
3. Information literacy	In the context of technology, it is the ability to store, retrieve, locate, select, organise, integrate, analyse, evaluate and apply information. This skill also entails the awareness of, and the importance of, information in ICT.

4. Media literacy	The skills required to interact with other users using technology. The understanding and appropriate usage of the various media platforms are imperative to be able to interact in society. Social media technology has become a basic medium of communication in society and is commonly used in both the personal and professional environments.
5. Communication and collaboration	The skill required for communication and collaboration is the ability to share and express information and knowledge using technology for a face to face or virtual environment. It also includes interpersonal skills, the ability to adhere to communication etiquette both online and offline, the ability to work in a team and to be open to the collaboration and sharing of information.
6. Real-time thinking	This skill entails “being aware of and processing various stimuli directed at one in virtual, interactive, multimedia environments” (Pokpas, 2014:186). This skill is the ability to use the technology to perform a single task or to multi-task whilst being stimulated by various stimuli. It also entails the ability to stay focused and to be able to complete the task at hand.
7. Creation of content	This skill is the combination of operational, information literacy and media literacy skills. An individual would be expected to create, edit and review with confidence digital information and knowledge that could be added to the digital platform
8. Transferable competences	These are high level non-technical skills used in both digital and non-digital contexts. The skills entail “critical thinking (which includes the process of reflection), strategic thinking, problem-solving, sense-making and a desire to continuously learn.” (Pokpas, 2014:186).

(Source: Adapted from Pokpas, 2014:184-186)

2.5 OPEN DISTANCE LEARNING

An ODL environment enables students to pursue further studies irrespective of their place and time constraints. ODL institutions offer students open access to education and training: the students are in control of their learning experience and they have more flexibility regarding the time, place and learning opportunities (Ghosh et al., 2012).

The term *open* in the ODL context refers to where an institution has removed unnecessary barriers to access learning and adopts the principle of student centredness. The institution promotes lifelong learning, meeting the needs of students, recognising prior learning, offering flexibility of learning and providing student support (Council of Higher Education, 2014; Joubert & Snyman, 2017). The use of DT plays a critical role in the ODL institutions. Through the use of DT, students will be able to have control of their learning experience and will benefit from the student support services provided by ODL institutions.

The term *distance learning* refers to educational opportunities available to students where the learning programme is designed in a manner according to which the student experiences teaching, learning, support and assessment while not being physically on the institution's premises (Council of Higher Education, 2014).

Distance learning occurs within a DE environment. DE takes place when the lecturer is separated from the student geographically, there is little face to face interaction and ICT is used for interaction (Rangara, 2015; Kellen et al., 2017; Mukherjee, 2018). DE additionally allows students to pursue their studies as part of lifelong learning while fulfilling their work, social and family obligations (Rangara, 2015). Students in a DE environment can, with the use of ICT, access various support systems offered, study independently and interact with content, lecturers and peers,

have more freedom of space and time and have flexibility in the learning process (Council of Higher Education, 2014).

According to Moore (1991), when referring to DE, the distance mentioned refers to the geographic separation between the student and the lecturer as well as the distance of understanding and perceptions that occurs due to the geographic separation. Moore (1991) further explains his theory of Transactional Distance, where distance exists between all relationships in the education environment. The educational relationships that exist in the institutions are between lecturer and student, student and student, student and institution, lecturer and institution. The transactional distance refers to the possible misunderstandings between the student and lecturer due to the psychological and communication gap that occurs because of the physical separation between the student and lecturer. The ideal environment would be to have a short distance between the student and the lecturer. According to Moore's Transactional Distance Theory, the interaction or dialogue between the student and the lecturer and the structure of the course design will determine the transactional distance (Moore, 1991; Arko-Achemfuor, 2017). The medium of the communication is vital in improving the dialogue and shortening the distance between the various relationships. Similarly, the manner in which the teaching programme is structured and delivered using various communication media will determine the distance between the various relationships.

Addressing the transactional distance factors and ensuring that effective teaching and learning occurs, Unisa, in its Open Distance eLearning Policy (Unisa, 2018a:2) defines ODL as:

a multi-dimensional concept aimed at bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware and student and peers. Open distance e-learning focuses on removing barriers to access learning, flexibility of learning provision, student-centredness, supporting

students and constructing learning programmes with the expectation that students can succeed;

Unisa (2018a) uses the term e-learning which implies that learning is facilitated using ICT and resources. Maphosa and Bhebhe (2019) emphasise that open distance e-learning (ODeL) is highly dependent upon the usage of ICT and that it is imperative for both students and academics to be digitally literate in an ODeL environment. As a result of the socioeconomic situation in SA, some students do not have access to ICT and the Internet, are not trained on how to use the systems or do not have the DL competence to use the online systems, so the ODeL model is not fully utilised at Unisa (Malale, Gomba & Dichaba, 2018). To support the students and to ensure academic success, Unisa currently uses the blended learning model, where teaching and learning is supported by a combination of the use of ICT, printed learning material and limited face to face interactions with students (Unisa, 2018a). Blended learning also allows students the flexibility to study using the method that they are most comfortable with, at their own time and pace (Tang & Chaw, 2016). A study conducted in Australia by Morgan (2018) reports that 66% of the students prefer a blended learning environment and learn best in such environments: such students also value the role that ICT plays in their learning process.

Unisa has further introduced the following e-learning interventions to enhance the teaching and learning experience and to assist students to transform from using the conventional method of print format to the online digital format: the LMS called myUnisa, student emails called myLife, online modules, compulsory Signature modules (online modules) in each qualification, discussion forums, e-Tutors and the usage of SMS (Short Message Service) to send messages to students. The students of Unisa use social media for educational purposes, and the new trend which has been initiated by students is to use WhatsApp for educational purposes (van Wyngaard, Strachan & Hülsmann, 2016; Malale et al., 2018).

ODL promotes lifelong learning where learning is an ongoing process. Learning occurs throughout one's life through knowledge and experience gained from informal education, formal education and training, life and/or work experience or a combination of these experiences (Council of Higher Education, 2014). Xing, Marwala and Marwala (2018) emphasise that lifelong learning will become a necessity to keep abreast of the rapid and continuous changes in ICT, and for humans to compete with machines in the future.

Furthermore, the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) supports the promotion of lifelong learning through ODL. UNESCO is committed to meeting its overall priority of ensuring that everyone has a right to education, and therefore supports ODL institutions to ensure that students have open access to education (Ghosh et al., 2012).

With the introduction of DT in an ODL environment, the student is in control of his studies and is encouraged to engage interactively with the content using different DT modes. The student is encouraged to be self-directed and to work independently and with peer students (Council of Higher Education, 2014). Students are in control of their own learning experience as they determine for themselves when they will study, what they will study, how they will study, where they will study and whether or not they will do the assessments (Opara-Onukwugha & Chikwendu, 2015; Firat, 2016).

There are many distance learning and ODL institutions globally (Mukherjee, 2018). Unisa, based in SA, is the "largest open distance learning institution in Africa and the longest standing dedicated distance education university in the world" (Unisa, 2019a). Unisa has 3 core areas of business: Teaching, Research and Community engagement. With teaching being one of the core areas of business at Unisa, the ODL model is used based on the following principles (Unisa, 2019c):

- Learner-centredness
- Lifelong learning
- Flexibility of learning facilitation provisioning
- Removal of barriers to access
- Recognition of prior learning
- Provision of relevant learner support
- Construction of learning programmes

Unisa's principles for teaching are in line the National e-Skills Plan of Action (NeSPA 2012) of SA (South Africa. Department of Communications, 2013). NeSPA 2012 was formulated as "building capabilities has to be at the core of developing more equitable prosperity and global competitiveness in the South African socio-economic platform that is increasingly dominated by new forms of ICT" (South Africa. Department of Communications, 2013:3). The NeSPA 2012 suggests various e-strategies to address the aims of the National Development Plan. The recommended actions for improving education, innovation and training are fostering e-learning for lifelong learning, recognising and responding to the new trends in online education including Massive Open Online Courses (MOOC), supporting development of e-skills for innovation, entrepreneurship and creative industry and encouraging and assisting HE institutions including further education and training colleges to prepare graduates with a set of e-skills by the NeSPA 2012 (South Africa. Department of Communications, 2013). The expected skills and outcomes are to promote lifelong learning, online learning, using ICT for social interaction and educational purposes and to prepare students to become confident users of ICT so that they can become citizens who will function comfortably in a global environment both in a personal and in the business environment.

With the aim of eliminating poverty and reducing inequality by 2030, the SA government has developed a strategic plan called the National Development Plan 2030. The National Development Plan is in line with the United Nations Sustainable

Development Goals, goal 4: “Ensure inclusive and quality education for all and promote lifelong learning” (South Africa [sa]: 9).

With the increase in growth of the advancement and usage of DT and the promotion of lifelong learning, the arena of tradition HE and ODL institutions is changing. Many traditional face to face HE institutions are tapping into the ODL environment and ensuring that education content is accessible globally by offering online modules, OERs, MOOCs and YouTube videos (Ghosh et al., 2012; South Africa. DHET, 2013; Blayone, 2018).

2.6 21st CENTURY SKILLS

Tertiary institutions play a vital role in providing DL training to students to ensure that they have the necessary DL competencies to cope in the 21st century workplace.

Twenty first century skills are skills that are necessary in order to be functional in the fast-changing DT-rich society and workplace. With the presence of DT in all spheres of our existence, it is imperative that we have the necessary skills to function in society and according to the high demands of the workplace. Twenty first century skills are not limited to technical skills in regard to using DT only. They are skills that will allow one to use and apply knowledge from the vast amount of information available (Van Laar et al., 2017) in an effective and efficient manner. The Partnership for 21st Century Learning defines 21st century skills as a combination of skills, knowledge, expertise and literacies that students should master in order to succeed in the workplace (Framework for 21st century learning definitions, 2019).

Various frameworks have listed several essential 21st century skills required by society and the workplace (Van Laar et al., 2017). As previously mentioned, some of the skills that have been identified as essential skills for the 21st century are creativity and innovation, critical thinking and problem solving, communication and

collaboration, information, media and technology skills, flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity, accountability, leadership and responsibility, technical skills, information management, ethical awareness, cultural awareness and lifelong learning (Van Laar et al., 2017; Framework for 21st century learning definitions, 2019). Many of the skills that have been identified as essential skills for the 21st century are the same as the digital competency skills as discussed previously under 2.2. Based on the literature reviewed, it may be concluded that DC skills and skills essential for the 21st century are the same set of skills and that one needs to be digitally literate in order to cope in the 21st century.

To be digitally literate in the 21st century, one needs to be able to learn, unlearn and relearn due to the constant and rapid changes in ICT (Önger & Çentin, 2018). With the current fast pace of the introduction of new DT, it is becoming more and more important to be digitally literate as we move into the 4IR.

In the Digital Transformation Index II, SA was ranked in the top 10 countries in leading the digital transformation change required to compete in the 21st century economies (Malinga, 2019; Hawkes, 2019). This implies that SA is making significant efforts to promote DL skills. Dell Technologies in collaboration with Intel, surveyed 4600 medium to large business leaders globally to analyse their transformation strategies and initiatives. SA's greatest barrier to transformation was reported as "Lack of the right in-house skills sets and expertise" (Dellemc, 2019:57). SA is importing specialised ICT skills from Europe and India as the country does not have high-level ICT skills (Hawkes, 2019). Across the African continent also, there are still many people who do not have basic DL skills. Many initiatives and training programmes are in place to address the DL skills shortage in Africa and in SA (Hawkes, 2019).

As discussed earlier in this chapter, many citizens of South Africa lack the basic skills of DL as well as the high-level DT skills that are required for the 21st century, and also to be able to compete globally. This is an area that needs to be monitored as DT is developing rapidly and citizens will be left behind as we move into the 4IR where higher cognitive skills are required. HE institutions therefore play a pivotal role in ensuring that all students acquire the necessary DT skills to meet the demands of the country.

2.7 FOURTH INDUSTRIAL REVOLUTION

Since DT was introduced in the early 1960s, we have experienced many changes in the way we live, work and socialise. DT has been a dynamic industry which has infiltrated all sectors of our lives, from personal, educational, and work, to the way we communicate and socialise. This trend is not slowing down and is in fact escalating at such a high speed that without realising it, we have moved into the 4IR, a term coined by Schwab (2016).

The 4IR is taking the digital revolution to a higher level, with unlimited possibilities being mooted. We are being introduced to the ubiquitous usage of mobile devices (smartphones, laptops, tablets), extensive internet usage at high speed, artificial intelligence, large volumes of storage capacity, big data, robotics, the Internet of Things, smart cities, driverless vehicles, and 3D printing, to name but a few (Schwab, 2016).

With the emergence of the new advanced DT, all spheres of life will be affected including the education, social and the business sectors. This implies that we need to evaluate the way we teach, do business, socialise and live our lives to ensure that we can incorporate the new DT of the 4IR into our daily lives.

International organisations and governments have already incorporated preparation for 4IR needs into their strategic planning policies and frameworks to ensure that their citizens are prepared with the necessary skills and competencies for the 4IR (Bughin et al., 2018; Kluzer & Priego, 2018; Chetty et al., 2018; Lyons et al., 2019). SA is no exception, and 4IR is addressed and included in several government documents, such as the National e-Skills Plan of Action (NeSPA) 2012, the National Integrated ICT Policy White Paper 2016, the National Development Plan 2030 and the Policy for the provision of distance education in South African universities in the context of an integrated post-school system 2014.

The primary to tertiary education system plays a pivotal role to ensure that students are fully prepared to meet the demands of the 4IR. The education system needs to ensure that their curricula include the skills and competencies that will be required by 4IR. The HE sector should ensure that all students are digitally competent, and should consider developing a system that is more holistic to cater for the creative and critical thinking skills required for the 4IR. Gleason (2018:146) suggests that higher education should “teach students *how* to learn, rather than *what* to learn in order to adjust and continue to have an education system that delivers what the economy needs”.

2.8 ATTITUDES TOWARDS DIGITAL TECHNOLOGY

The attitudes of students towards ICT plays a significant role in whether ICT will be used for educational purposes (Jelfs & Richardson, 2013; Pokpas, 2014; He & Zhu, 2017). A positive attitude contributes positively to self-efficacy which ultimately contributes to student success (Prior et al., 2016). Self-efficacy as defined by Cambridge online dictionary is “a person’s belief that they can be successful when carrying out a particular task” (Dictionary.cambridge). Self-efficacy plays a vital role for the success of the student in an ODL environment (Prior et al., 2016). A lack of

self-efficacy with regard to the use of ICT would contribute to avoidance of using ICT (Pokpas, 2014).

Students in an ODL environment are autonomous learners and need to use DT on a constant basis. Attitude towards the use of DT for educational purposes plays a vital role for effective teaching and learning in an ODL environment. Students in an ODL environment additionally need to be open to change due to the constant changing and updating of ICT or learning platforms (Rangara, 2015). Literature reviewed (Jelfs & Richardson, 2013; Alothman, Robertson & Michaelson, 2017; Kitchakarn, 2015) has shown that students have mixed attitudes towards using DT for educational purposes. Alothman et al. (2017) report that some students have a positive attitude towards using computers while other students feel discomfort and anxiety which lead to a negative attitude. Kitchakarn (2015) claims that, overall, students have a positive attitude towards using computers as a learning tool. This is supported by Jelfs and Richardson (2013) who report that students with a more positive attitude towards ICT tend to follow the deep learning approach towards their studies. Deep learning approach is when students make an effort to understand what they are studying. A study conducted by Nagy and Habók (2018) confirms that the use of ICT engagement and positive attitude towards ICT plays a substantial role in learning and learner efficacy.

In light of the aforementioned, there are a number of antecedent factors that contribute to the students' attitudes towards computers: age, gender, English language proficiency, training in computer usage, number of years of computer usage experience, access to the Internet, usage of hand-held technological devices, level of DL competence, residence (urban vs rural) and frequency of computer usage (Kitchakarn, 2015; Alothman et al., 2017; Jan, 2018). A few of the factors that contribute to the attitudes on the usage of DT for educational purpose are discussed below.

Gender

Due to the inequalities and social standings of gender in different cultures and countries worldwide, various studies have been conducted to determine whether gender plays a role in the attitudes of students towards the usage of DT. Some studies have found that gender is not a significant factor influencing the attitudes of students towards using ICT (Kitchakarn, 2015; Alothman et al., 2017; Baturay, Gökçearsan & Ke, 2017; He & Zhu, 2017; Jan, 2018). On the other hand, Jelfs and Richardson (2013) report that men have a more positive attitude towards ICT than do women. These findings indicate that in recent years more females are using DT and have similar attitudes towards the usage of DT as do their male counterparts.

Prior experience of using computers and prior computer training

Students' prior computer experience is a contributing factor to their attitudes towards using DT. The lack of prior computer experience and DL competence leads to having a negative attitude towards using computers (Kitchakarn, 2015; Alothman et al., 2017). Kitchakarn (2015) states that the number of years of prior computer experience has no impact on the attitudes of students; however, the ability of students to use computer programs plays a role in students' attitudes towards computers.

Jan (2018) claims that the amount of time spent on using the computer contributes to the attitudes of students towards using DT, with the study showing that the more time that students spend on the computers, the lower the attitudes students had towards using DT. The reason could be due to the increased usage of smartphones and tablets and the decrease in using desktop computers (Alothman et al., 2017; Jan, 2018). Contrary results were reported by Baturay et al. (2017) who claim that the time spent daily on using computers had no influence on students' attitudes towards ICT.

Proficiency in the English language

Lack of proficiency in the English language is reported to be a barrier to the usage of computers as most computer software packages and applications are English based (Allothman et al., 2017). Students with poor English language proficiency tend to experience anxiety or a low of confidence level which in turn leads to a negative attitude towards using ICT (Allothman et al., 2017). On the other hand, Jan (2018) found that proficiency in English had no influence on the attitude towards the use of ICT.

DL competence

Students' level of DL competencies contributes significantly to their attitudes towards using DT for academic purposes. Jan (2018) reports that students with a high DL level of competence had a more positive attitude towards using ICT as opposed to students with a low DL level of competence. Baturay et al. (2017) point out that there is a significant and positive relationship between computer competence, attitude towards ICT and the intention towards technology acceptance.

An extensively used theoretical framework, Unified Theory of Acceptance and Use of Technology (UTAUT), formulated in 2003, has been used to explain and understand the acceptance and use of information systems and information technology (Dwivedi, Rana, Jeyaraj, Clement & Williams, 2019). The original model stated that the four constructs: performance expectancy, effort expectancy, social influence and facilitating conditions, had an impact on behavioural intention which impacted on the use behaviour (Venkatesh, Morris, Davis & Davis, 2003). Dwivedi et al. (2019) added attitude in the reviewed UTAUT model as they found that attitude is a fundamental contributor to the acceptance and use of information systems and information technology. They further found that the four constructs of the original model – performance expectancy, effort expectancy, social influence and facilitating

conditions – have both a direct and an indirect influence on attitude. Furthermore, they found that attitude has an impact on behavioural intention and on use behaviour.

The application of the revised UTAUT model implies that it would be beneficial to shape the attitudes of the students towards the usage of DT by explaining and showing students the ease of use of DT and the usefulness of using DT for students' academic benefit.

From the above discussions, it is clear there are various factors that influence the attitudes of students towards using DT for educational purposes and these factors could contribute either positively or negatively towards the usage of DT for educational purposes. Moreover, literature has also shown that attitude plays an important role in the intention to use, as well as in the usage of, DT for educational purposes.

2.9 LEARNER MANAGEMENT SYSTEM (LMS)

LMS software programmes are tools used to facilitate the teaching and learning processes and which can be beneficial to the institution, lecturers and students. The LMS can be accessed from any device that is connected to the internet. LMS is used to support and facilitate online learning (Mabila, Gelderbloom & Ssemugabi, 2014; Chirume & Thondhlana, 2019). Students can use the LMS to perform administration tasks, have access to learning material, interact with lecturers and fellow students, submit assignments, track their progress and carry out various other tasks related to teaching and learning (Rangara, 2015; Mtebe, 2015; Mkhize, Mtsweni & Buthelezi, 2016; Al-Shboul, Al-Saideh & Al-Labadi, 2017; Zanjani, Edwards, Nykvist & Geva, 2017; Balderas, De-La-Fuente-Valentin, Ortega-Gomez, Doderio & Burgos, 2018; Chirume & Thondhlana, 2019).

Many HE institutions have used the LMS to their benefit and have implemented LMS usage to assist in facilitating the teaching and learning process while also providing a variety of services and tools to the students. The LMS allows the students to be in control of their studies: they can access the LMS at any time at their convenience. They are thus given the freedom to manage their own learning process (Zanjani et al., 2017; Balderas et al., 2018). During the literature review, the following examples of LMS were found that are used by various institutions: MyVista, Moodle, Sakai, dotLRN, and Blackboard (Mabila et al., 2014; Mtebe, 2015; Drew & Forbes, 2017; Zanjani et al., 2017; Balderas et al., 2018).

As an ODL institution, Unisa required an LMS that would meet its need to bridge the gap between the institution, the students and the lecturers. The LMS used at Unisa is called myUnisa. Students are required to register on myUnisa upon completion of registration to study (Unisa, 2019d). Students are able to perform administration functions such as editing their registrations and their own personal information. They can also perform various academic tasks such as the downloading of study material and past examination papers, the uploading assignments, participating in discussion groups, interacting with e-Tutors, accessing e-resources, accessing the online library, and accessing their student email (called myLife), amongst many other academic tasks that can be performed (Unisa, 2019h). Students are able to access the LMS using any device that has access to the Internet. Students are encouraged to use myUnisa to enhance their learning experience and to use ICT as opposed to the tradition method of using print format (Unisa, 2019h).

The usage of the LMS promotes the DL competency skills of communication, collaboration, creation of content, problem solving, critical thinking and cognitive skills through activities that encourage communication and collaboration whilst using the LMS (Zanjani, Edwards, Nykvist & Geva, 2016; Balderas et al., 2018). Additionally, students benefit from using the LMS as their academic performance

improves: it increases the student satisfaction rate and reduces the dropout rate (Mtebe, 2015).

For the LMS to be fully utilised by students, the lecturers' presence and interaction on the LMS play a crucial role. The acceptance and usage of the LMS by students is dependent on numerous factors: the lecturer's attitude towards using the LMS as a teaching tool, the lecturer's teaching style which is suited to online learning, the presence of lecturers which will encourage engagement with students and amongst students, the design of appropriate online activities and assessment methods, and the technological capabilities of the lecturers (Zanjani et al., 2016). Additional factors that influence the usage of the LMS are instructional design, level of comfort with ICT, sufficiency of technical support, the usage of the LMS being better than using the old conventional method, and the LMS being easy to understand and use (Mabila et al., 2014; Alshammari, Ali & Rosli, 2016; Mkhize et al., 2016).

Discussions from above confirm that the usage of the LMS by students and lecturers is paramount for effective teaching and learning in an ODL environment. ODL institutions should be aware of the factors discussed above that influence the usage of the LMS and should ensure that systems are in place to encourage both students and lecturers to make the best use of the LMS.

2.10 DL TRAINING PROGRAMMES

As we are moving into the 21st century and concomitantly the 4IR, DL competency is a necessity and, as mentioned, an essential skill in the workplace and in society worldwide. It is essential to ensure that we have a society of responsible digital citizens. Digital citizens are individuals who can use ICT to participate in economic and social activities in a responsible, effective and efficient manner (Ke & Xu, 2017).

To ensure that students are adequately prepared for the world of work, HE institutions worldwide are including DL training initiatives into their curricula (Alexander et al., 2017).

The DT field is supported by a rapidly evolving industry and users need to be kept abreast of new developments and changes. Various studies conducted in Austria, Denmark, Finland, Germany and Switzerland have reported that people of all ages have overestimated their DL skills and that significant DL skills gaps do exist (ECDL Foundation, 2016). A study conducted in Singapore confirms these findings (Gottipati, 2017).

Students entering HE will clearly have different levels of DL knowledge and skills due to their different socio-economic backgrounds. To ensure that all students have the required competence in DL, Omotosho, Lateef, Amusa, and Bello (2015) recommend that HE institutions should provide compulsory DL training to all newly admitted students irrespective of their prior DL knowledge and skills. Training will help to ensure the effective and efficient use of DT for all spheres of the teaching and learning process and will eventually lead to graduateness. Students need to be trained on how to use the LMS to obtain relevant information online, use the online library and databases and to be able to use ICT to enhance their learning experience (Omotosho et al., 2015; Weber, Hillmert & Rott, 2018). Alfonzo and Batson (2014) support the need for DL training as most students do not have the necessary DL skills for an advanced level of research. Shopova (2014) further adds that, while many students know how to use computers for social media, emails and games, their ability to use ICT for learning purposes is limited and therefore emphasised that training in DL competency is essential. Shopova's (2014) study shows that improving DL and the skills of using ICT contributes positively to successful performance in the learning process. Ukwoma et al. (2016) similarly concludes that students use DL skills daily and that the use of DL has had a positive impact on their academic performance.

The use and understanding of DT could be overwhelming for students who have never used or been exposed to DT in their home or school environment. Oyedemi and Mogano (2018) state that students from rural and disadvantaged backgrounds in SA have minimal access to ICT at their schools and thus they may enter university without any DL skills. DL training would benefit such students so that they will be able to use DT and to be able to participate effectively in the tertiary environment.

Face to face training would be the best mode for ICT basic training as the student will feel more comfortable to have human and social interaction (Pokpas, 2014). The training programme should be focused in such a way that the students' individual needs are met within a group of students with different levels of skills (Pokpas, 2014; Schreurs, Quan-Haase & Martin, 2017; Tsai, Shillair & Cotten, 2017; Sharp, 2018; James & Seary, 2019). For more advanced DL training, online training can be offered with the use of MOOC and OERs.

To ensure that all Unisa students are fully trained in DL, Unisa offers various DL training programmes free of charge to all registered students at all regional offices. Some of the DL training programmes offered are: myUnisa and myLife, Signature Modules (Introduction to online learning), MS Word, MS Excel, MS PowerPoint, Introduction to Unisa Library: services and procedures, Using the Unisa Library Catalogue, Introduction to E- Resources, Using Reference sources, Introduction to Reference techniques, to name but a few. myUnisa training, usage of Smartboard and usage of social media in education are some of the training programmes offered to the face to face tutors at Unisa.

2.11 SUMMARY OF DISCUSSIONS

To summarise, then, Table 2.4 below provides a summary of the key concepts of different aspects related to the research topic.

Table 2.4: Summary of key concepts

KEY CONCEPTS	SUMMARY
<i>Digital competence</i>	The term DC has a variation of definitions by various authors due to the different viewpoints of the authors which have resulted from the constant on-going changes in ICT and the changing needs of society (Ilomäki et al., 2016). For the purpose of this study, DC will be referred to as the knowledge, skills and attitudes towards DT of students in an educational, social, economic and workplace environment.
<i>Digital literacy</i>	Similar to DC, a variation of definitions of DL were found as many authors have adjusted the definition of DL to suit their context on the usage of computers as the demand of society and workplace has changed (Hossain, 2014; Pokpas, 2014; Julien, 2015; Buckingham, 2016; Ilomäki et al., 2016; Chetty et al., 2018). For the purpose of this study, the researcher views DL as a combination of literacies required to use the various components of DT effectively, efficiently and responsibly to engage actively in the educational, social, economic and workplace environment.
<i>Digital literacy frameworks</i>	There are numerous DL frameworks globally, with each one stating its own variations of terminologies, definitions for DL

	<p>and set of skills (Hall et al., 2014; Pokpas, 2014; Ilomäki et al., 2016; Alexander et al., 2017; Chetty et al., 2018).</p> <p>For the purpose of this study, the e-skills for the digital inclusion framework (Pokpas, 2014) was used as it is best suited in a South African context where the focus of DL is on ICT skills and job skills (Alexander et al., 2017).</p> <p>This framework consists of eight competence components: basic, technological, information, media, communication and collaboration, real-time thinking, creation of content and transferable. The expected knowledge, skills and attitudes were specified for each of the eight components (see Appendix A).</p>
<p><i>Open distance learning</i></p>	<p>Literature has shown that ODL institutions are institutions that are flexible and have removed barriers to allow entry to students. The mode of delivery is through distance learning where the student has no face to face contact with the lecturers. ICT plays a critical role in an ODL environment and both students and the academics need to be digitally literate (Maphosa & Bhebhe, 2019).</p>
<p><i>21st century skills</i></p>	<p>As the 21st century is driven by DT, the skills required are in line with the needs and demands of society and the workplace. The list of skills for the 21st century are varied, and some of the skills required for the 21st century are: technical, information management, communication, collaboration, creativity, critical thinking and problem solving,</p>

	ethical awareness, cultural awareness, flexibility, self-direction and lifelong learning (Van Laar et al., 2017).
<i>Fourth industrial revolution</i>	<p>With DT being a dynamic industry with new DT components being introduced frequently, the education sector needs to embrace DT and to ensure that it is updating its curricula to meet the demands of society and the workplace. The 4IR has introduced the need for new sets of skills and competencies and the education system needs to ensure that their curricula include the skills and competencies that will be required by 4IR.</p> <p>As previously mentioned, Gleason (2018:146) suggests that HE should “teach students <i>how</i> to learn, rather than <i>what</i> to learn” so that they are in a position to adapt to whatever the future may hold in terms of DT.</p>
<i>Attitudes towards digital technology</i>	Attitudes towards DT is a contributing factor to the usage of DT for academic purposes. Literature has identified a number of antecedent factors that contribute to students’ attitudes towards computers: age, gender, English language proficiency, training in computer usage, number of years of computer usage experience, access to the Internet, usage of hand-held technological devices, level of computer skills and residence (urban vs rural) (Allothman et al., 2017; Jan, 2018).
<i>Learner management system</i>	The LMS is used to support and facilitate online learning (Mabila et al., 2014; Chirume & Thondhlana, 2019). Students can use the LMS to perform administration tasks,

	<p>have access to learning material, interact with lecturers and fellow students, submit assignments and perform various other tasks related to teaching and learning (Rangara, 2015; Mtebe, 2015; Mkhize et al., 2016; Chirume & Thondhlana, 2019). The usage of the LMS is vital in an ODL environment, and students are strongly encouraged to use such systems optimally.</p>
<p><i>DL training programmes</i></p>	<p>The DT field is part of a dynamic industry and students enter with different levels of DL knowledge and skills. To ensure that students are adequately prepared for the world of work, HE institutions worldwide are including DL training initiatives into their curricula (Alexander et al., 2017).</p> <p>Studies have shown that most students know how to use computers for social media, emails and games; however their abilities in terms of using ICT for learning purposes are limited and the studies therefore recommend that training in DL competency is essential (Shopova, 2014).</p>

(Source: Author)

Table 2.4 above provides a synopsis of the key tenets which will be focused on.

2.12 CONCLUSION

This chapter discussed the literature on the key concepts and variables used in this study: DC, DL, DL frameworks, open distance learning, 21st century skills, fourth industrial revolution, attitudes towards DT, learner management system and DL training programmes.

Chapter 3 will discuss the research methodology and design used in this study.

CHAPTER 3

RESEARCH METHODOLOGY AND DESIGN

3.1 INTRODUCTION

This chapter explains the research methodology and design adopted for this study. It includes a detailed description and discussion on the research approach, population and sampling, instrumentation and data collection techniques, reliability and validity and research ethics followed in the study. The overview of the research methodology and design used in this study is presented in Figure 3.1.

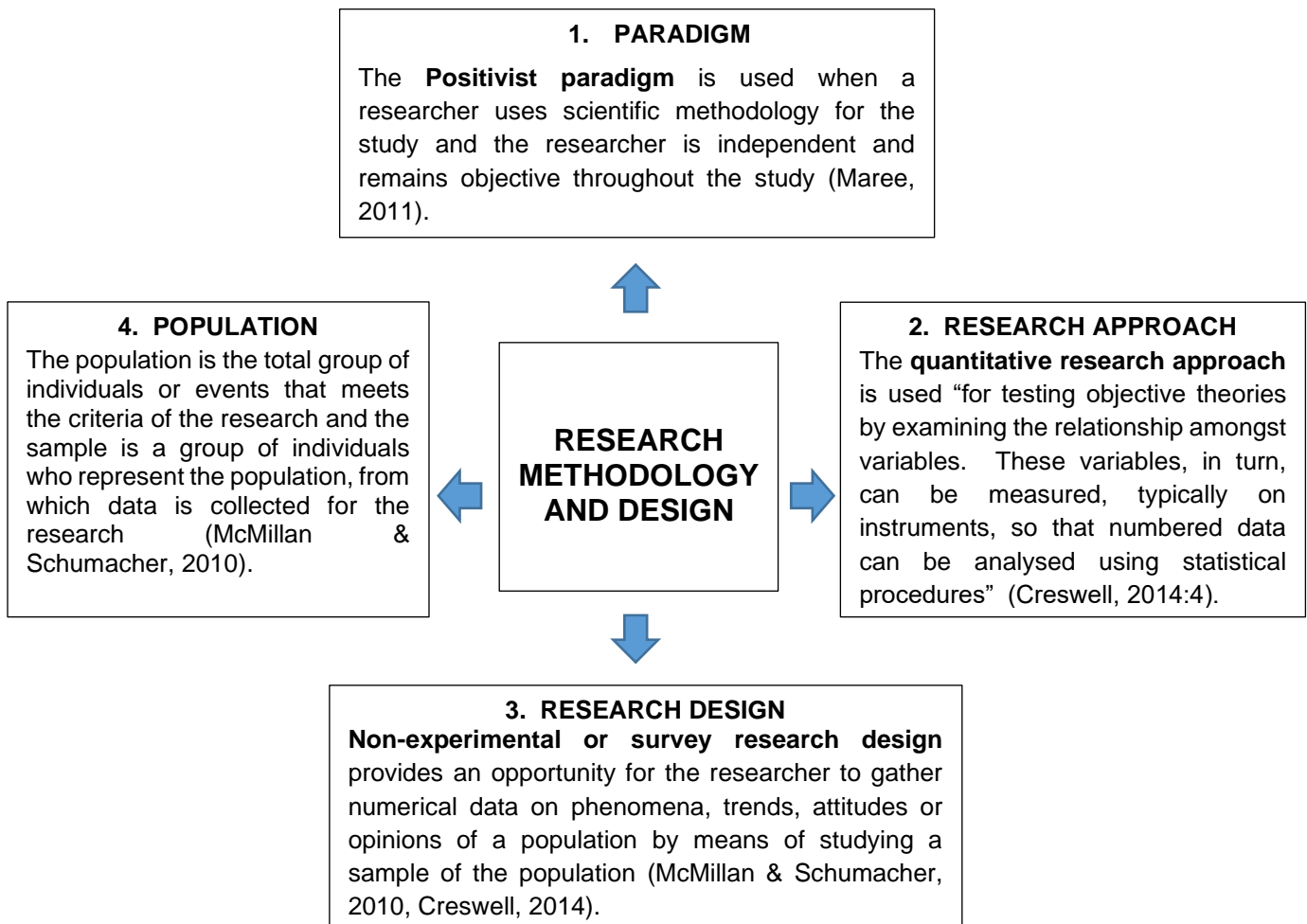


Figure 3.1: Overview of research methodology and design (Source: Author)

3.2 RESEARCH PARADIGM

A paradigm is determined by the way the researcher sees the world. Maree (2011:47) explains that “a paradigm is a set of assumptions or beliefs about fundamental aspects of reality which gives rise to a particular world-view”. The paradigm or worldview guides the researcher on how to conduct the research. Positivist, post-positivist, constructivist, transformative or pragmatic paradigms are examples of the various viewpoints from which that the researchers could see the world (McMillan & Schumacher, 2010; Welman et al., 2012; Creswell, 2014).

The positivist paradigm is based on the logical positivism philosophy where a set of rules is followed to conduct a study and to report the results (McMillan & Schumacher, 2010; Welman et al., 2012). The positivist paradigm is used for scientific research methodologies where the researcher ensures objectivity throughout the study (Maree, 2011). The researcher is detached from the study and reports on the research from an outsider’s perspective (Welman et al., 2012).

A post-positivist viewpoint is when a researcher identifies the causes and then assess the causes that could have an impact on the research outcomes of the study (Creswell, 2014). The post-positivist researcher believes that the laws or theories that govern the world need to be tested or verified and if necessary they need to be refined to understand the world (Creswell, 2014). The post-positivism paradigm worldview emerged after the positivism paradigm.

The constructivist worldview, also known as social constructivism or interpretivism, holds a different viewpoint of the world (Creswell, 2014). The constructivist seeks to understand the world that he or she is living in, from the experience or viewpoint of the participants (Welman et al., 2012). The researcher becomes involved in the study and interacts with the participants to obtain the participant’s view (Creswell, 2014).

The transformative worldview addresses social issues that affect marginalised individuals in society (Creswell, 2014). With a transformative worldview, researchers would address empowerment matters, and issues of inequality, oppression, suppression or domination (Creswell, 2014).

The pragmatic worldview proposes that there is more than one way of seeing the world and many ways of doing research (Saunders et al., 2012). The pragmatic worldview will use all research approaches to understand the research problem to ensure that the data collected is credible, reliable and well-founded (Saunders et al., 2012; Creswell, 2014).

To achieve the aim and objectives of this study, the positivism paradigm was used. In order for the researcher to remain objective, an online questionnaire was sent to the students. The collected data was analysed by the researcher and reported upon in an objective and unbiased manner.

3.3 RESEARCH APPROACH

The research approach includes the plans and methods that the researcher will follow throughout the phases of the study (Creswell, 2014). There are three types of research approaches namely qualitative, quantitative and mixed methods.

The qualitative research approach is used when the researcher collects data directly from the participants while they are in their natural environment, using techniques such as face-to-face interviews or observation (McMillan & Schumacher, 2010). The quantitative research approach is used to collect data objectively and the collected data is analysed numerically using statistical procedures (McMillan & Schumacher, 2010; Creswell, 2014). The mixed methods approach is the combination of the qualitative and quantitative approaches which will give the researcher a more detailed understanding of the research problem (Creswell, 2014).

The quantitative research approach was used for this study. The researcher used the quantitative approach as numerical data on the variables of this study were collected and analysed in an unbiased manner using statistical techniques. The independent variables of this study are attitudes towards DT for educational purposes, usage of the LMS, and attendance at regional DL workshops. The dependent variable of this study is the perceived DL competencies. This method furthermore allowed the researcher to examine the relationships between the variables.

3.4 RESEARCH DESIGN

A research design is the plan on how the research will be conducted to meet the aim and objectives of the study (Mouton, 2001; Saunders et al., 2012). The research design can further be defined as the conceptual structure or blueprint that is followed to conduct the study (Kothari & Garg, 2019). A research design intended to achieve the aim and objectives of this study was constructed by the researcher, and is indicated in Figure 3.2.

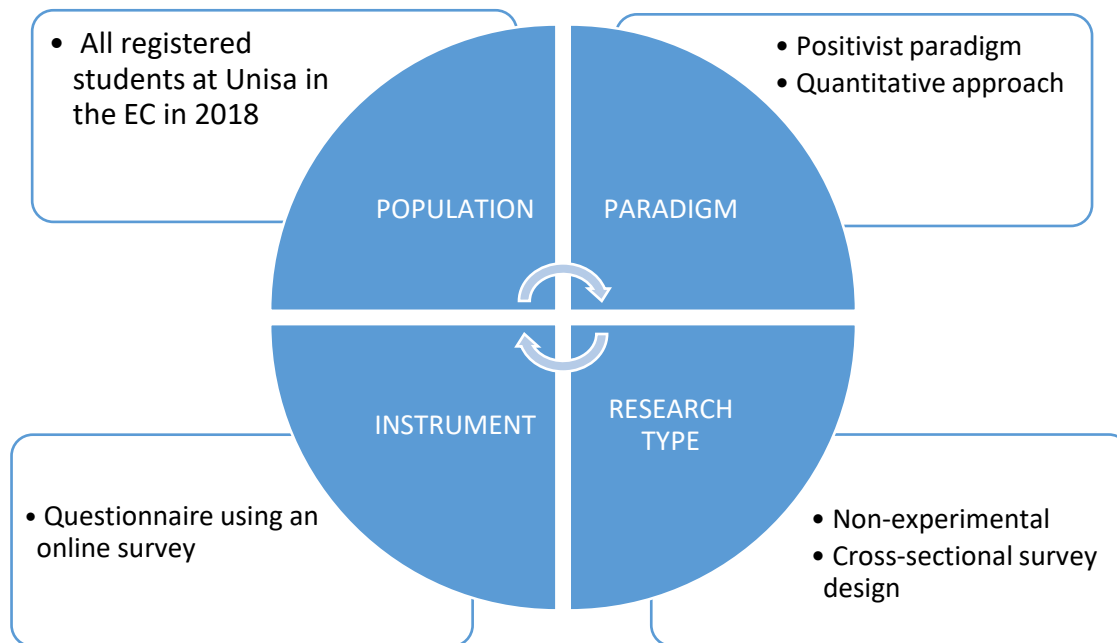


Figure 3.2: Research design (Source: Author)

As illustrated in Figure 3.2, this study views the world from a positivist point of view and has used the quantitative approach. The researcher chose a non-experimental, cross-sectional survey design as this method was best suited to meet the aim and objectives of this study. To collect the data, a questionnaire using an online survey was sent to all the students who were registered at Unisa in the EC in 2018. The research design is explained in detail below.

There are several different research designs that can assist the researcher to attain the aim and objectives of the study. Examples of research designs are: experimental (true experimental, quasi-experimental, single subject), non-experimental (descriptive comparative, correlational, survey, *ex post facto*), explanatory, exploratory, triangulation, concept analysis, historical analysis, policy analysis, ethnographic, phenomenologic, case study, grounded theory and critical studies (McMillan & Schumacher, 2010). The research design method is dependent on the research approach used for the study.

This study used the quantitative research approach and there are two overarching research designs within the quantitative research approach: experimental design and non-experimental design. The experimental design is used when the researcher divides the subjects into two groups. A specific treatment is given to one group only. The researcher would then determine if the treatment had any influence on the outcomes for both groups (Creswell, 2014). Non-experimental research design provides an opportunity for the researcher to gather numerical data on phenomena, trends, attitudes or opinions of a population by means of studying a sample of the population (McMillan & Schumacher, 2010; Creswell, 2014).

This study employed a non-experimental, cross-sectional survey design. A cross-sectional methodology is “used to investigate variables or a group of subjects in different contexts over the same period of time” (Collis & Hussey, 2009:77). McMillan and Schumacher (2010) further explain that this method allows the researcher to study a large group at the same time with no additional costs. The cross-sectional method allowed the researcher to collect various data from the participants in the same period of time using an online survey. It thereafter allowed the researcher to examine the relationships between the variables (Bryman et al., 2014). This design method was the best suited design for this study as the researcher aimed to investigate and describe the perceived DL competencies of Unisa ODL students in the EC province in South Africa.

3.5 RESEARCH METHODS

3.5.1 Population and Sampling

The population is the total group of individuals or events that meet the criteria of the research and the sample is a group of individuals who represent the population, from which data is collected for the research (McMillan & Schumacher, 2010).

3.5.1.1 Population

McMillan and Schumacher (2010:129) define the population as “a group of elements or cases, whether individuals, objects, or events, that conform to specific criteria and to which we intend to generalize the results of the research”. Welman et al. (2012) further define the population as the complete set of cases that meets the criteria and from which a sample will be taken for the study. McMillan & Schumacher (2010) refers to the target population as the full group of cases.

The target population for this study comprised of all students who were registered in 2018 for both formal and non-formal qualifications at Unisa in the EC. The EC student population at the time of this study in 2018 was 16 983 of registered students for all three regional offices (Unisa, 2019b), see Table 3.1 below. The EC region consists of three offices: East London, Port Elizabeth and Mthatha. Therefore, the target population for this study was 16 983 which includes all registered students in 2018 for all qualifications in the EC.

Table 3.1: Eastern Cape Unisa population – Total number of students registered for 2018

REGIONAL OFFICE	TOTAL NUMBER OF UNISA STUDENTS REGISTERED FOR 2018
East London office	6 010
Port Elizabeth office	5 856
Mthatha office	5 117
Total number of students registered for 2018	16 983

(Source: Unisa, 2019b)

3.5.1.2 *Sampling*

A sample consists of a small number of individuals who share similar characteristics of the population that it represents (McMillan & Schumacher, 2010). The sample is called the sampling frame (McMillan & Schumacher, 2010; Welman et al., 2012). A sample is used when the population is too large to conduct the study on (Welman et al., 2012). Samples are used to collect data for the study and the results of the study are later used to generalise to the population.

The sample should represent the target population by having similar properties to those of the population (Welman et al., 2012), with a 95% confidence level of representing the population. To ensure that the sample represents the population, the confidence level and the margin of error are taken into consideration (Welman et al., 2012). The confidence level refers to the percentage according to which the sample represents the true population (McMillan & Schumacher, 2010). The margin of error describes how close one can reasonably expect a survey result to be in respect to the true population value (Creswell, 2014). A 95% level of confidence implies that 95% of the sample would represent the population with a 5% probability of error (McMillan & Schumacher, 2010).

There are two types of sampling: probability sampling and non-probability sampling. Probability sampling is when the probability of selecting participants to represent the population is known and that each participant has an equal chance of participating (McMillan & Schumacher, 2010). Non-probability sampling is when all members of the population do not have an equal probability of being selected in the sample (Welman et al., 2012).

Census sampling is used when the entire target population is used for the study. Bryman et al (2014:171) define census as “the enumeration of an entire population”.

Similarly, Cantwell (2008) explains that census sampling is used when attempts are made to collect information from a defined population.

For this study, the census sampling method was used. The census method was used for this study as the entire target population was known and easily accessible via email, there were no financial implications in sending and receiving the questionnaire and a greater response rate was expected, as one of the disadvantages of online surveys is the low response rate from participants (McMillan & Schumacher, 2010). To alleviate the risk of a low response rate and to obtain as many responses as possible, the questionnaire was sent to the entire target population.

To determine the sample size, the Krejcie and Morgan (2010) table (see Table 3.2 below) was used, as the population was known after the registration period was closed. The Krejcie and Morgan (2010) table reflects the sample size with a confidence level of 95% and 5% margin of error.

With the population of 16 983, the sample size as per the Krejcie and Morgan (2010) table was 377.

Table 3.2: Table for determining sample size for finite population

<i>Table for Determining Sample Size of a Known Population</i>									
N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*



(Source: Krejcie & Morgan, 2010)

3.5.2 Data collection methods and instrumentation

Data collection is a process of gathering data to answer the research question(s) or to meet the research objectives (Saunders et al., 2012). Data can be divided into two categories: primary data and secondary data (Collis & Hussey, 2009; Saunders et al., 2012). Primary data is data that is collected from the original source using surveys, interviews or focus groups to answer the research question. Secondary data is data that is collected from existing sources such as policies, publications or databases (Collis & Hussey, 2009; Saunders et al., 2012).

To meet the aim and objectives of this study, the researcher, during the empirical phase of the study, collected primary data directly from the participants who completed the questionnaire using an online survey.

3.5.2.1 *Instrumentation*

A questionnaire is defined as “a written set of questions or statements that is used to assess attitudes, opinions, beliefs and biographical information” (McMillan & Schumacher, 2010:489). An online survey is when the Internet is used to create the survey, send the survey link via an email to the participants and to receive the response electronically from the participants (McMillan & Schumacher, 2010; Bryman et al., 2014).

A questionnaire can have different types of questions or items: open or closed questions, scale items, ranked items or checked items (McMillan & Schumacher, 2010). Open ended questions are used to obtain a response from the participant in his or her own words (McMillan & Schumacher, 2010). Closed ended questions allow the participants to choose from a predetermined list of answers (McMillan & Schumacher, 2010; Saunders et al., 2012). Rating scale type questions are used in questionnaires as “they allow fairly accurate assessments of beliefs or opinion” (McMillan & Schumacher, 2010:198). Saunders et al. (2012) explain that the Likert scale rating questions give the participants an opportunity to rate how strongly the participant agrees or disagrees with a given statement. Ranked items are questions that allow the participant to rank a list of given options from highest to lowest (McMillan & Schumacher, 2010). Checked items are questions that allow the participants to choose from a number of given options. The participants may choose more than one option (McMillan & Schumacher, 2010).

The researcher used closed ended questions, Likert scale rating questions and check item questions in the questionnaire as they were best suited to obtain the required data to meet the aim and objectives of this study.

The researcher created a new questionnaire to meet the aim and objectives of the study (see Appendix B). To ensure that the questionnaire was correct, valid and reliable, the questionnaire was assessed by the supervisor and statistician.

The questions in the questionnaire were based on the competency components of the e-skills for digital inclusion framework (Pokpas, 2014) (see Appendix A). The eight competency components were embedded in the survey: basic, technological, information, media, communication and collaboration, real-time thinking, creation of content and transferable, as have been referred to previously. The three values of DC were also embedded in the survey: knowledge, skills and attitude.

The questionnaire consisted of six sections (section A to section F). For the purpose of this study and to answer the research questions only sections A, B, C, E and F were analysed. The data collected for section D will be analysed and reported to the EC regional management to address the challenges that the students are experiencing with accessibility to DT.

Section A of the questionnaire addressed the socio-demographical information required to obtain the participants' profiles. Closed ended questions were used in Section A as they are most suited to the obtaining of demographic information (McMillan & Schumacher, 2010). Data collected from this section enabled the researcher to understand the profile of students in the EC.

The questions in Section B addressed the skills and knowledge of students on the eight DC components. A combination of closed ended questions and Likert scale

questions were used in this section. Questions in this section were used to investigate the perceived DL competencies of ODL students in the EC.

Section C questions reflected on the attitudes of students towards the eight DC components. Only Likert scale questions were used in this section. Questions in this section were used to meet the first objective of this study – to determine students' attitudes towards DT for educational purposes.

The questions in Section D addressed the students' accessibility to technology. However, the questions in this section were not analysed for this study as accessibility to technology was not an objective of this study. Data collected from this section will be analysed at a later stage and a report will be submitted to the EC regional management on the challenges that students are encountering with regard to accessibility to DT. This report will assist the EC regional management with decision making on the ICT infrastructure of the EC management. A combination of closed ended questions, checked item questions and Likert scale questions were used in this section.

Section E questions were related to the students' usage of the LMS. This section consisted of both closed ended questions and Likert scale questions. Questions in this section were analysed to meet the second objective of this study – to investigate the extent to which students use the Unisa LMS.

Section F questions reflected on the students' attendance of regional DL workshops. A combination of checked items, closed ended questions and Likert scale questions were used in this section. Questions in this section assisted in meeting the third objective of this study – to determine whether students attend regional DL workshops in the EC.

To conduct this questionnaire, an online survey tool was used to gather information from the participants. The Survey Monkey software program was used to create the online survey and to collect the data.

3.5.2.2 Pilot study

Prior to the study, a pilot study was conducted to test the questionnaire. The pilot study assisted the researcher to improve the questions, format the scales and to measure the approximate time that would be required to complete the questionnaire (McMillan & Schumacher, 2010; Creswell, 2014). Face validity and content validity were used to test the questionnaire during the pilot study phase.

In adherence to Unisa's Policy for conducting research involving Unisa employees, students or data (Unisa, 2018b), the pilot study was conducted after the ethical clearance certificate and the permission to conduct research at Unisa were received (see Appendix C and Appendix D).

3.5.2.3 Data collection

The Unisa ICT department, as a gatekeeper, emailed the online survey link to all participants of the study using their myLife email addresses. The myLife email address is a free email address that is given to all registered Unisa students. Unisa uses this email address to communicate with the students (Unisa, 2019f). The gatekeeper is a delegated authority that has access to the participants and is responsible to send the covering letters and emails to the participants (Unisa, 2018b). A covering letter with the link to the survey was emailed to the entire population of registered students in 2018 in the EC. The covering letter informed the participants on the aim and objectives of the study, duration of the survey, closing date of the survey, the ethical clearance certificate received and the contact details of the researcher, supervisor and the ethics office. The participants were informed that they would be participating anonymously (see Appendix E for the covering

letter). The survey was conducted over a six-week period. A reminder email was sent after two weeks as the researcher had observed that the response rate was low (see Appendix F for the reminder email sent). Responses had been received from 381 participants when the survey closed after 6 weeks, which is more than the 377 responses, as indicated by Krejcie and Morgan (2010) in Table 3.2 above. The data collected from Survey Monkey was exported to SPSS and the Survey Monkey account was closed.

3.5.3 Data Analysis

Data collected using the survey is referred to quantitative data (Collis & Hussey, 2009; Saunders et al., 2012). This data is in the raw stage and has no meaning. To convert this data to meaningful information, the researcher needs to process, analyse and interpret the data so that the research questions can be answered (Saunders et al., 2012).

The methods used to organise, analyse and understand quantitative data are called statistics (Collis & Hussey, 2009; McMillan & Schumacher, 2010). Statistical techniques are divided into two types of techniques: descriptive and inferential statistics. To achieve the aim and objectives of this study and to answer the research questions both descriptive statistics and inferential statistics were used.

3.5.3.1 *Descriptive statistics*

Descriptive statistics are used to summarise and to present the data in a meaningful manner for an understanding of the sample. Descriptive statistics summarise data one variable at a time (McMillan & Schumacher, 2010). There are different ways of describing data: univariate, bivariate or multivariate. Univariate analysis is used to summarise data of one variable, bivariate analysis is used when two variables are used and multivariate is used when more than two variables are summarised (Welman et al., 2012). The following univariate statistical procedures could be used

to analyse data: frequency distributions, measures of central tendency, measures of dispersion and measures of normality (Collis & Hussey, 2009; McMillan & Schumacher, 2010). Bivariate analysis can use the following statistical procedures to analyse the data: correlation, comparing frequencies, comparing percentages, comparing means and comparing medians (McMillan & Schumacher, 2010).

Descriptive statistics using univariate statistical procedures were used in this study to analyse the demographic data and the data collected on the variables: perceived DL competencies, attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops. Frequency distributions were generated from SPSS to analyse the descriptive data. Frequency distributions are tables which display the number and the percentage of responses received for a value of a variable (Collis & Hussey, 2009). The data reported on the frequency distributions for this study is presented in tables and graphs in Chapter 4.

3.5.3.2 *Inferential statistics*

Inferential statistics are used to draw conclusions or inferences about the population from the quantitative data of the sample (Collis & Hussey, 2009; Welman et al., 2012). Kothari and Garg (2019) further add that inferential statistics are also used to test hypotheses and to draw inferences.

To test the hypotheses of this study, correlational statistics were used to determine the hypothesised relationships between the dependent and independent variables (Collis & Hussey, 2009; McMillan & Schumacher, 2010; Welman et al., 2012; Kothari & Garg, 2019). The derived correlation coefficients can then be used to measure the direction and strength of the relationship between the two ranked or numerical variables (McMillan & Schumacher, 2010; Saunders et al., 2012). Correlation coefficients range from -1 to +1, with +1 representing a high strength of the relationship in a positive direction and -1 representing a high strength of the

relationship in a negative direction (McMillan & Schumacher, 2010). Correlation coefficients close to zero indicate that there is no relationship between the variables (Welman et al., 2012).

Prior to conducting any correlational analyses, however, the distribution of the composite score of DL competencies was inspected. This provided the researcher with an indication as to which correlational techniques should be adopted – parametric or non-parametric.

Parametric tests are used when interval data is used, the sample size is large, there is normality in the distribution of the population, there is equal variance of the data and the mean is used for statistical procedures (McMillan & Schumacher, 2010; Saunders et al., 2012). The Pearson's correlation coefficient is the parametric test statistic that measures the relationship between variables. Non-parametric tests are used when data is not normally distributed (Saunders et al., 2012; Field, 2013). Spearman's rho and Kendall's tau correlation coefficients are used for non-parametric statistics (McMillan & Schumacher, 2010; Saunders et al., 2012).

The Pearson's chi-squared test of association was used to examine the association(s) between the socio-demographic characteristics of the participants and their perceived DL competencies. The chi-squared test is a non-parametric test used to determine the relationship or association between two nominal or ordinal variables (Maree, 2011; Bryman et al., 2014). A relationship was regarded as statistically significant if the probability value (p-value) was less than .05.

To determine which inferential technique to use, the Kolmogorov-Smirnov test was used to determine whether the distribution of DL competency values was normally distributed or not. The Kolmogorov-Smirnov test (see Table 4.4) revealed that the DL competency scores were not normally distributed and therefore the non-parametric technique was employed.

Non-parametric correlation coefficients tests were used to test the hypotheses by examining the extent of the statistical relationship between the variables. Non-parametric tests are used when data are not normally distributed (Field, 2013). The Kendall's tau correlation coefficient (Field, 2013) was used to determine the relationship between the dependent variable perceived DL competency and the independent variables: attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops. Kendall's tau correlation coefficient was chosen as this method produces a more accurate representation of the correlation and generalisation to the population (Field, 2013). The probability value (p) generated from the one-tailed analysis assisted in determining the significance of the results to test the hypothesis. A significant correlation was realised if a p -value was less than .05 and a highly significant correlation was when the p -value was less than .01. The correlation coefficient values and the probability values (p) were analysed to either accept or reject the hypothesis.

3.6 RELIABILITY AND VALIDITY

Reliability and validity are used to ensure that the instruments used in the research are of high quality and to ensure trustworthy results of the research (McMillan & Schumacher, 2010).

Reliability refers to when the results are consistent when using the same instrument over a period of time to the same sample (McMillan & Schumacher, 2010; Maree; 2011). The questionnaire needs to be tested for reliability to ensure that the results are consistent if the exercise is repeated under the same conditions (Maree 2011). To ensure that the questionnaire was accurate and reliable, an internal consistency test was done to measure the reliability of the questionnaire. Internal consistency is when there should be a high degree of similarity when there are numerous questions to measure a specific idea (Maree, 2011). The Cronbach's alpha coefficient is used to determine the consistency of items measuring a single variable (McMillan & Schumacher, 2010). The guidelines provided by Maree (2011) were used to assess

the level of reliability: if Cronbach’s alpha is 0.90 then it indicates high reliability, 0.80 indicates moderate reliability and 0.70 low reliability. Results with a Cronbach’s alpha value > 0.70 are acceptable by some authors (McMillan & Schumacher, 2010; Bryman et al., 2014; Saunders et al., 2012). The results of the internal consistency reliability using Cronbach’s alpha are shown in Table 3.3.

Table 3.3: Internal reliability results using Cronbach’s alpha

Construct	No. of items	Cronbach’s alpha	Acceptable level
Perceived DL competencies	12	.946	High
Attitudes towards DT for educational purposes	13	.833	Moderate
Usage of the LMS	14	.820	Moderate
Attendance at DL workshops	6	.972	High

Table 3.3 indicates that the perceived DL competencies and attendance at regional DL workshops had a reliability coefficient of more than 0.90 which indicates a high level of reliability. Attitude towards DT for educational purposes and the usage of the LMS had a reliability coefficient greater than 0.80, which indicates a moderate level of reliability. All the variables had a Cronbach’s alpha value above 0.70, which indicates that the questionnaire used was soundly reliable for the purpose of this study.

According to McMillan and Schumacher (2010:173), “[v]alidity is the judgement of the appropriateness of a measure for specific inference”. In other words, validity requires that the instrument must test what it is meant to test to achieve the objectives. Internal validity refers to the control measures of the variables in the study. External validity refers to how the results can be generalised to the population or to real life (Maree, 2011). There are different types of validity checks: face validity, content validity, criterion validity and construct validity (Flick, 2011; Maree, 2011;

Creswell, 2014). Face validity is to ensure that the instrument appears to measure what it intended to measure (McMillan & Schumacher, 2010; Maree, 2011). To test face validity, the researcher asked colleagues and students to test-run the survey by means of the pilot study to ensure that questions were clear and relevant and to measure the time taken to complete the survey. Content validity is to ensure that the questions in the questionnaire are aligned to the objectives of the study and that there are sufficient questions to meet the objectives (McMillan & Schumacher, 2010; Maree, 2011; Flick, 2011). The researcher, together with the supervisor and statistician assessed the content validity of the questionnaire.

3.7 RESEARCH ETHICS

Research ethics is defined as what is morally correct and incorrect when conducting the research. The researcher has the responsibility to ensure that the research is conducted in an ethical manner (McMillan & Schumacher, 2010).

This research was conducted according to, and in compliance with, the Policy of Research Ethics of Unisa (Unisa, 2016) and Policy for conducting research involving Unisa employees, students or data (Unisa, 2018b). As previously stated, no data was collected prior to the receipt of the ethical clearance certificate and the permission to conduct research at Unisa was received (see Appendix C and Appendix D).

To ensure compliance of the international moral principles as stated in the Policy of Research Ethics of Unisa, the researcher ensured that the following principles: autonomy of participants, beneficence of the study, non-maleficence of participants and people in general and justice (Unisa, 2016) were adhered to throughout this study.

3.7.1 Autonomy of participants

The researcher had no interaction with or influence over the participants, and the participants participated in the research of their own free will. All participants were able to discontinue with the survey if they wished to leave the survey without completing it.

3.7.2 Beneficence of the study

The results of this study will benefit the students of the EC region as the suggested DL workshops will assist students in improving their DL competencies.

3.7.3 Non-maleficence of participants

This study has not caused any harm to staff or students of Unisa in the EC region.

3.7.4 Justice

The results of the study will benefit the EC regional management in improving student support in the region and may benefit the students as their DL competencies should improve if they participate in the regional DL workshops.

Upon the receipt of the ethical clearance certificate (see Appendix C), an application for permission to conduct research involving Unisa students was submitted to the Research Permission Subcommittee at Unisa (see attached Appendix G). See attached Appendix D for the approval letter from the Research Permission Subcommittee. The pilot study only commenced after the receipt of the approval to conduct research at Unisa.

Privacy, anonymity and confidentiality as per the ethics policy were adhered to throughout the research process. A cover letter was emailed to all participants via their myLife email address informing them of the purpose of the research. All participants were assured that the survey would remain anonymous and that they would not be obliged to participate in or complete the survey. The cover letter also stated that by completing and submitting the survey, the participant gave consent to the researcher (see Appendix E).

3.8 CONCLUSION

This chapter has provided the research methodology and design that was adopted for this study. It included detailed descriptions and discussions on the research approach, population and sampling, instrumentation and data collection techniques, reliability and validity, data analysis of the study and research ethics.

Chapter 4 will discuss the data analysis and the presentation of the results.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 INTRODUCTION

This chapter presents the findings of the study carried out to meet the aim and objectives. The aim of this study is to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA. The study comprises five main objectives:

1. To determine students' attitudes towards using DT for educational purposes.
2. To investigate the extent to which students use the Unisa LMS.
3. To determine whether students attend regional DL workshops in the EC.
4. To examine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies.
5. To examine whether there is a statistically significant relationship between students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops and perceived DL competencies.

The chapter begins with a presentation on the reliability of the instrument by measuring its internal consistency using the Cronbach's alpha statistics. The description of the socio-demographic and academic characteristics of the sample is then presented followed by a descriptive analysis of perceived DL competencies, attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops. The descriptive statistics are presented in the form of graphs and tables.

Correlational statistics follow, with first using the Chi-square test to determine the association(s) between the socio-demographic and academic characteristics of the participants and their perceived DL competencies.

The chapter concludes with the inferential statistics derived from Kendall's tau non-parametric correlation coefficient which was used to test the strength and direction of association between the dependent variable, perceived DL competencies and independent variables: attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops. The following sets of hypotheses were tested and reported upon:

H1₀: There is no statistically significant relationship between attitude towards DT for educational purposes and perceived DL competencies.

H1₁: There is a statistically significant relationship between attitude towards DT for educational purposes and perceived DL competencies.

H2₀: There is no statistically significant relationship between the usage of the LMS and perceived DL competencies.

H2₁: There is a statistically significant relationship between the usage of the LMS and perceived DL competencies.

H3₀: There is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.

H3₁: There is a statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.

4.2 RELIABILITY

The scale of reliability of the instrument was assessed by measuring its internal consistency using Cronbach's alpha coefficient. Cronbach's alpha coefficient is

used to determine the consistency of items measuring a single construct (McMillan & Schumacher, 2010). The guidelines provided by Maree (2011) were used to assess the level of reliability. These guidelines state that if Cronbach's alpha is 0.90, high reliability is indicated, 0.80 indicates moderate reliability and 0.70 low reliability. As previously stated, results with a reliability value > 0.70 are acceptable by many authors (McMillan & Schumacher, 2010; Bryman et al., 2014; Saunders et al., 2012). The results of the internal consistency reliability using Cronbach's alpha are shown in Table 4.1.

Table 4.1: Internal reliability results using Cronbach's alpha

Construct	No. of items	Cronbach's alpha	Acceptable level
Perceived DL competencies	12	.946	High
Attitude towards DT for educational purposes	13	.833	Moderate
Usage of the LMS	14	.820	Moderate
Attendance at DL workshops	6	.972	High

The perceived DL competencies and attendance at regional DL workshops had a reliability coefficient of more than 0.90 which indicates a high level of reliability, as indicated in Table 4.1. Attitude towards DT for educational purposes and the usage of the LMS had a reliability coefficient of greater than 0.80 which indicates a moderate level of reliability. The questionnaire was soundly reliable for the purpose of this study as all the variables had a Cronbach's alpha value above 0.70.

4.3 DESCRIPTIVE STATISTICS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS

As the census survey methodology was used, the online survey was distributed to the entire population of EC Unisa students. The Unisa ICT department sent the

survey link to all registered students (18 038) via their myLife email accounts (see Appendix K). The number of emails sent to students was greater than the student population of 16 983, according to the statistics received from Unisa's Department of Institutional Research and Business (Unisa, 2019b). The discrepancy value of 1 056 of the student population did not affect this study as all students who were registered during the period of the study had received the questionnaire. The possible discrepancy of the student population is due to the two known reasons. Firstly, the statistics received from the Department of Institutional Research and Business reflect only students who are registered for formal qualifications. Secondly, the student population fluctuates due to administration reasons according to which students are added onto the system or students cancel their registrations. The discrepancy is reported as a limitation of the study in Chapter 5.

A total of 381 students responded to the survey, producing a response rate of 2%. A low response rate is one of the disadvantages of online surveys (Bryman et al., 2014). The low response rate is further discussed as a limitation in Chapter 5. Responses from four participants were incomplete and were removed from the data set. The total of 377 responses were analysed and reported upon. The targeted sample size was reached, despite the exclusion of the four participants.

The students were asked to indicate their socio-demographic characteristics as well as their academic characteristics. Descriptive statistics using frequencies and percentages through graphical representation are reported on for the socio-demographic and academic characteristics of the participants.

4.3.1 Socio-demographic characteristics of the participants

The socio-demographic characteristics of the participants in the form of their gender, age, home language, employment status and urban/rural living environment are

depicted below. Some of the graphs present the sample of this study, the EC student population and the entire Unisa student population for comparison purposes.

4.3.1.1 Gender

Figure 4.1 illustrates the gender of the participants, the EC student population and the entire Unisa student population.

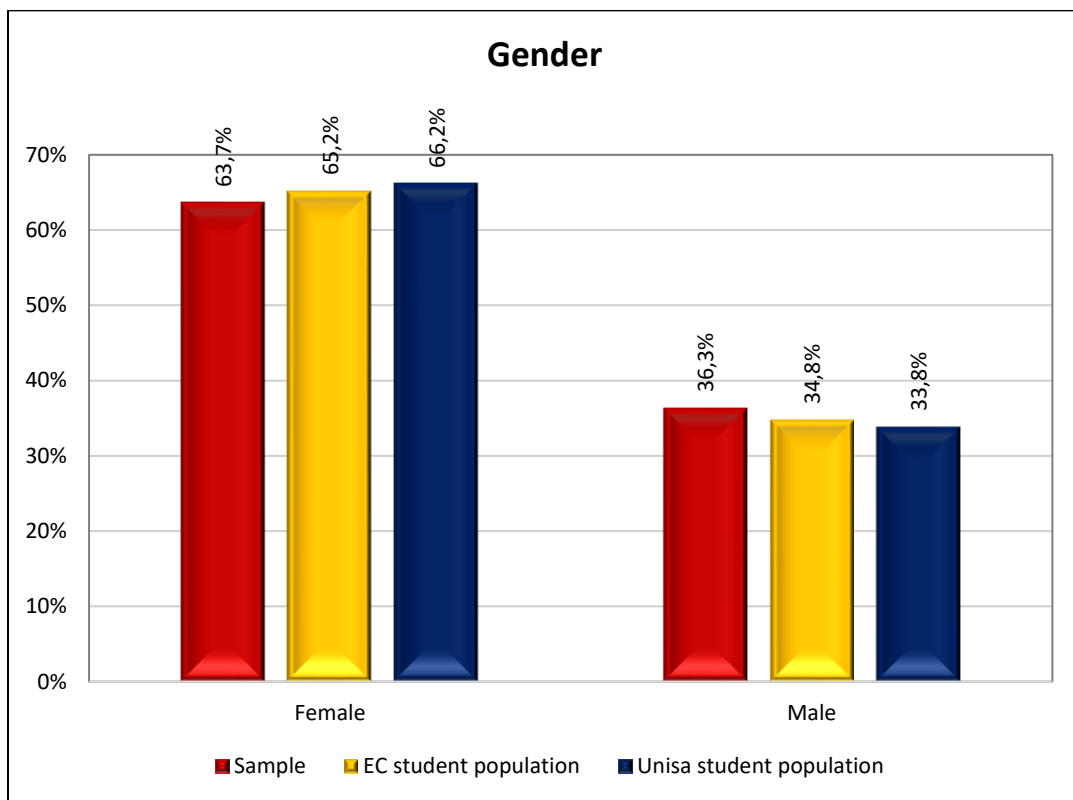


Figure 4.1: Gender of the participants (n=377)

Figure 4.1 indicates that most of the participants, 63.7% (n=240), were females, with males constituting 36.3% (n=137) of the total. The results shown in Figure 4.1 are representative of the EC Unisa student population where the majority are female (65.2%), with 34.8% being male, and of the entire Unisa student population with a female population of 66.2% and a male population of 33.8% (Unisa, 2019b).

4.3.1.2 Age

The ages of participants, the EC student population and the entire Unisa student population are shown in Figure 4.2.

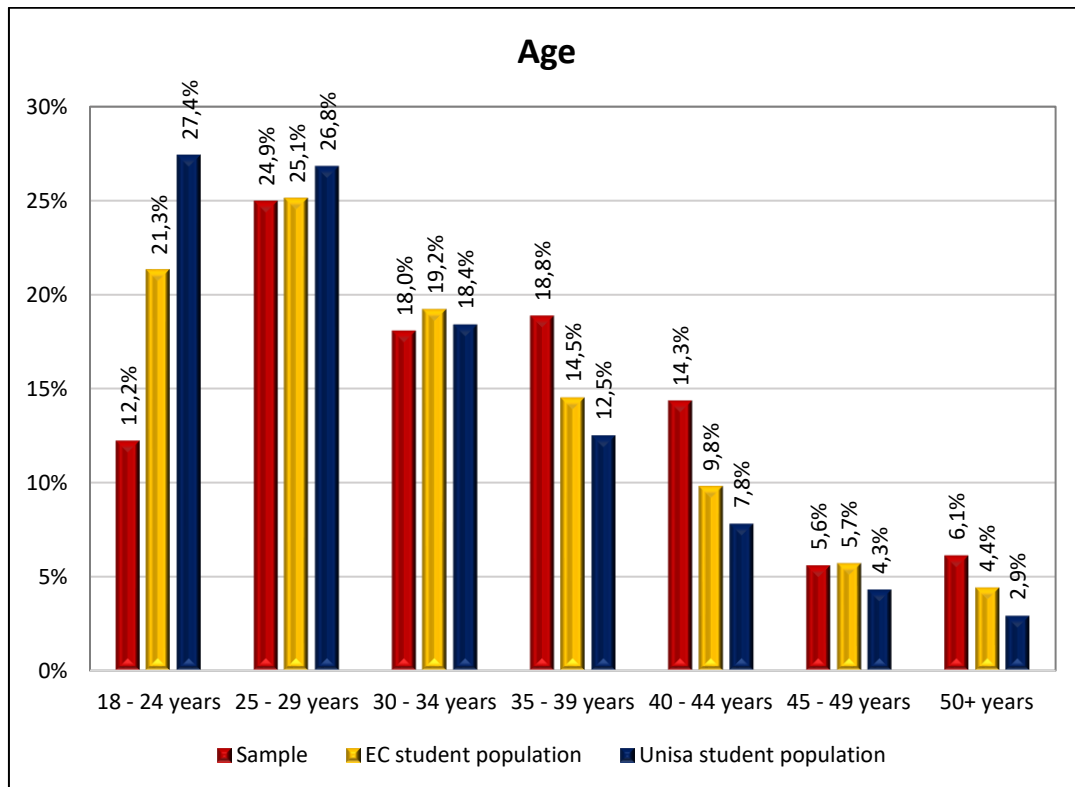


Figure 4.2: Age of participants (n=377)

Figure 4.2 shows that the highest proportion of participants were aged between 25 and 29 years with a proportion of 24.9% (n=94), followed by those aged from 35 – 39 years with a proportion of 18.8% (n=71); 18.0% (n=68) were aged from 30 – 34 years and 14.3% (n=54) were aged between 40 and 44 years. It may be noted that most of the participants were below 40 years of age.

The age composition of the sample of participants is not entirely consistent with the EC student population as the highest percentage of the students (25.1%) were in

the 25 – 29 years age category, followed by 21.3% of the students in the age category of 18 – 24 years, 19.2% of the students in the age category of 30 – 34 years and 14.5% of the students in the age category of 35 – 39 years (Unisa, 2019b).

Similarly, in the entire Unisa student population, the highest number of students were aged from 18 – 24 years (27.4%) and 25 – 29 years (26.8%), followed by 18.4% of the students were aged from 30 – 34 years and 12.5% aged from 35 – 49 years (Unisa, 2019b). It may be noted that the majority of the students in the EC population and the entire Unisa population were below 40 years of age and that most of the students were in the age category of 25 – 29 years. This information is useful for marketing purposes for recruitment of students, for marketing of regional DL workshops and for decision making on student support programmes. The results of the age characteristic can therefore not be generalised to either the EC population or to the entire Unisa population due to the age differences in the sample.

4.3.1.3 Home language

The results of the most popular home language are shown in Figure 4.3.

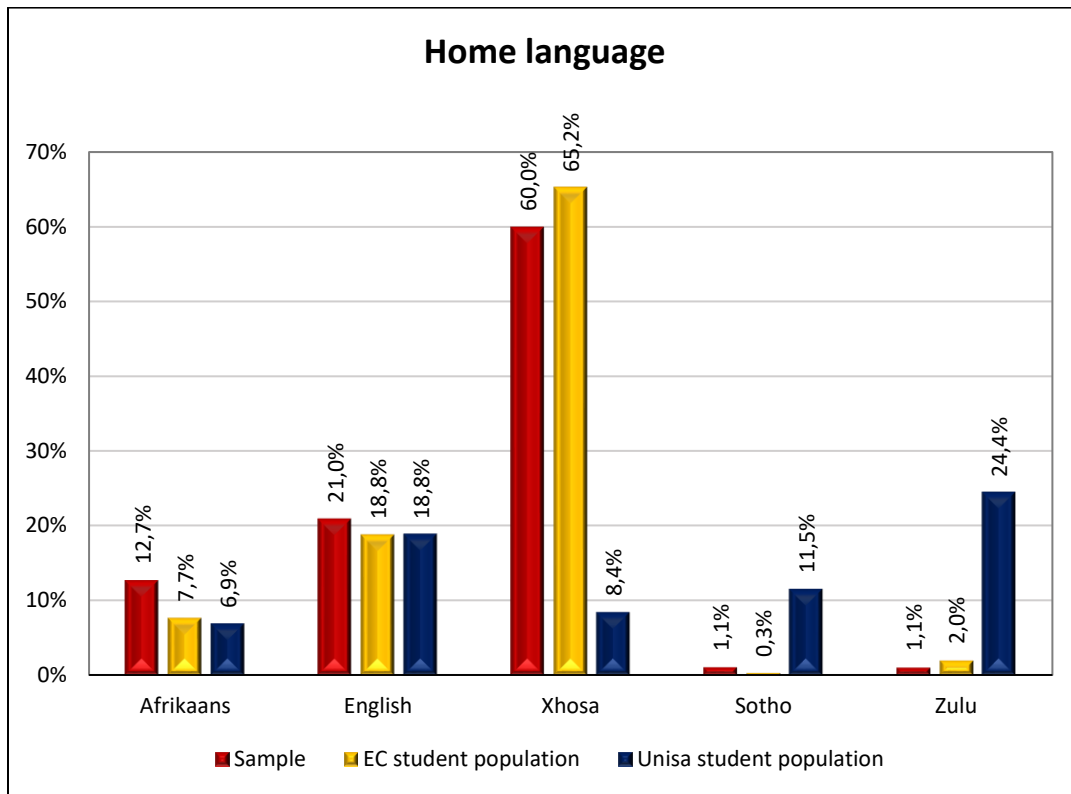


Figure 4.3: Home language of participants (n=377)

The highest proportion of participants were Xhosa speakers with a proportion of 60.0% (n=226) followed by English speakers with a proportion of 21.0% (n=79) and Afrikaans speakers of 12.7% (n=48) as indicated in Figure 4.3.

The sample represents the EC Unisa student population at the time of the study, as a similar pattern is seen in the EC Unisa student population, with 65.2% being Xhosa speakers, 18.8% English speakers and 7.5% being Afrikaans speakers (Unisa, 2019b).

A different language profile is seen in regard to the entire Unisa student population, where the most common languages spoken were Zulu (24.4%) followed by English (18.8%) and Sotho (11.5%) (Unisa, 2019b). The language profile of the EC students at the time of data collection, therefore, cannot be generalised to the entire Unisa student population, as the EC student population has a different language profile.

4.3.1.4 *Employment status*

The employment status is illustrated in Figure 4.4.

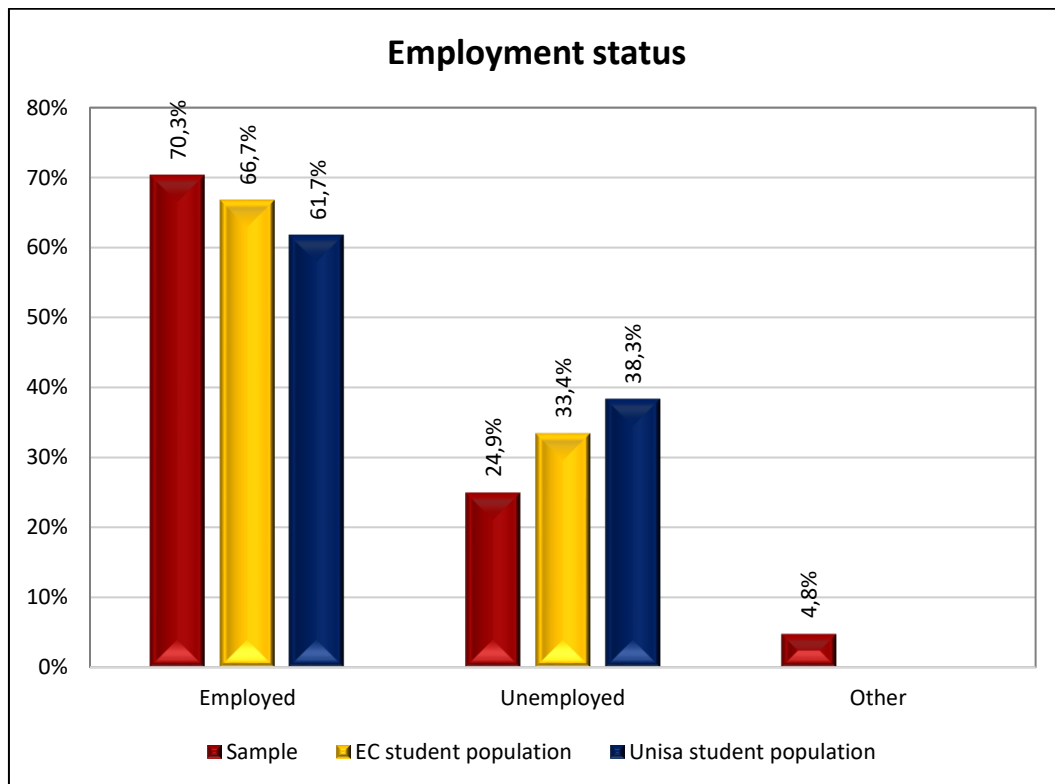


Figure 4.4: Employment status of participants (n=377)

Figure 4.4 indicates that the majority of the participants, 70.3% (n=265), were employed, 24.9% (n=94) were unemployed and the Other category comprised 4.8% (n=18).

A similar pattern is found in the EC Unisa student population: 66.7% were employed and 33.4% were unemployed, similar to the Unisa student population, where 61.7% were employed and 38.3% were unemployed (Unisa, 2019b). The unemployment rate for the second quarter of 2019 for the EC province population was 35.4% (South Africa, 2019b). The employment status of the study can be generalised to the EC student population, the Unisa student population and to the EC population as the majority are employed.

4.3.1.5 Urban/Rural living environment

Figure 4.5 illustrates the urban/rural environment in which the participants live.

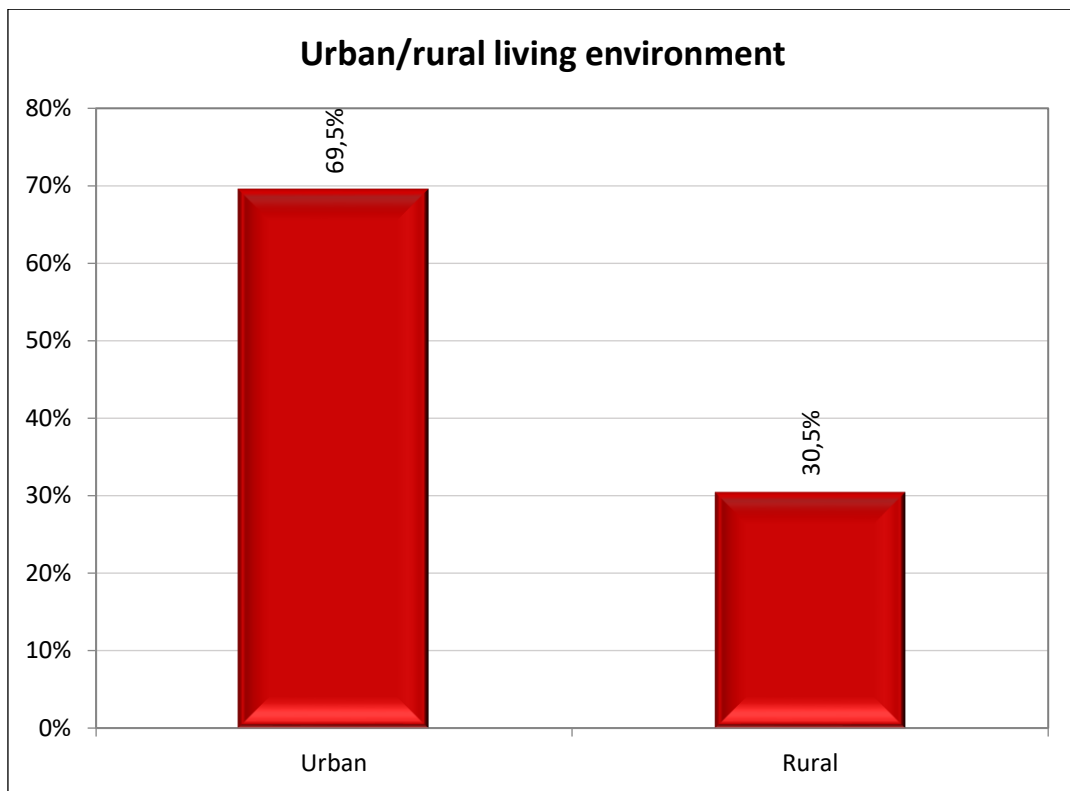


Figure 4.5: Urban/Rural living environment (n=377)

Figure 4.5 shows that the majority of the participants (69.5% (n=262)) lived in urban areas while 30.5% (n=115) lived in rural areas. The sample is not generalised to the EC student population and the Unisa student population as such statistics were not available.

The results of the South African National Census conducted in 2011 indicated that the largest population of the EC is in O.R. Tambo district, followed by Nelson Mandela Bay and Amathole (South Africa, 2011). No updated literature could be found on the rural and urban living environments in the EC and therefore, the living environment of the participants cannot be generalised to the EC province population.

4.3.2 Academic characteristics of the participants

The academic characteristics of the participants, at the time of data collection, such as the level of qualification for which they are currently registered, their current registered level of study, college of study, closest regional office and prior computer training or experience, are depicted below.

4.3.2.1 Level of qualifications currently registered

The qualification levels that the participants are currently registered for, at the time of data collection, are shown in Figure 4.6.

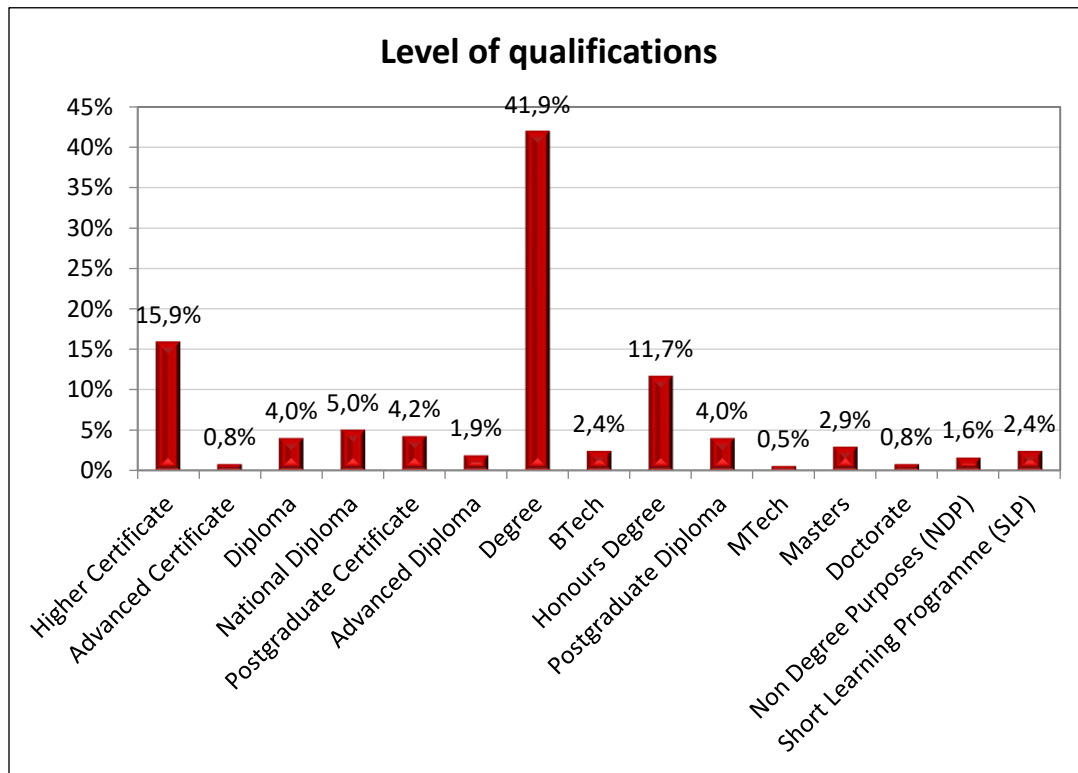


Figure 4.6: Level of qualifications in terms of current registration (n=377)

Figure 4.6 indicates that the highest proportion of participants were registered for undergraduate degrees. This constituted 41.9% (n=158) of the participants, while 15.9% (n=60) were registered for higher certificates, 11.7% (n=44) for honours degrees and 9% (n=34) were registered for diploma and national diploma qualifications. It is noteworthy that participants from all levels of qualifications responded to this study.

The three highest levels of qualifications that the participants were registered for – undergraduate degrees, higher certificates and honours degrees – were compared to the EC student population and Unisa student population as shown in Figure 4.7.

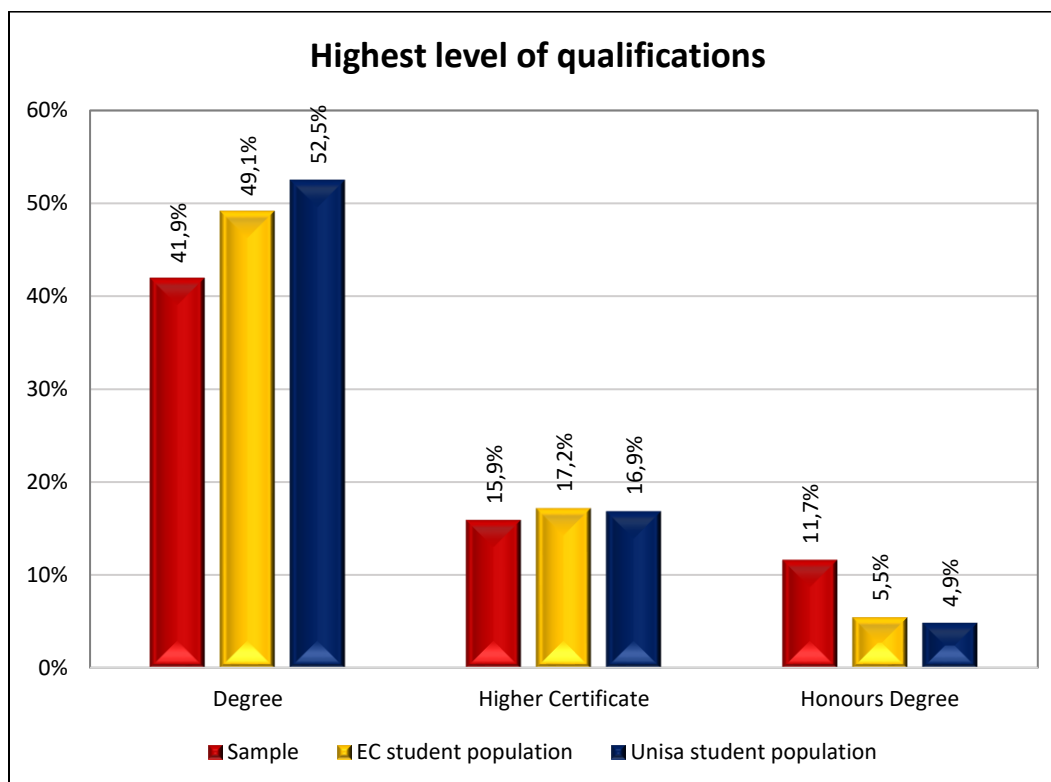


Figure 4.7: Three highest level of qualifications in terms of current registration

Figure 4.7 indicates that the majority of the students in the EC student population were registered for undergraduate degrees (49.1%) followed by higher certificates (17.2%) and honours degrees (5.5%). A similar pattern is seen in the Unisa student population, with the highest proportion of the students registered for undergraduate degrees (52.5%), followed by higher certificates (16.9%) and honours (4.9%) (Unisa, 2019b). Similar patterns have been found in the study results representing the EC student population and the entire Unisa student population with the majority of the students registered for degree qualifications.

4.3.2.2 Level of study currently registered

The level of study the participants are currently registered for, at the time of data collection, is shown in Figure 4.8.

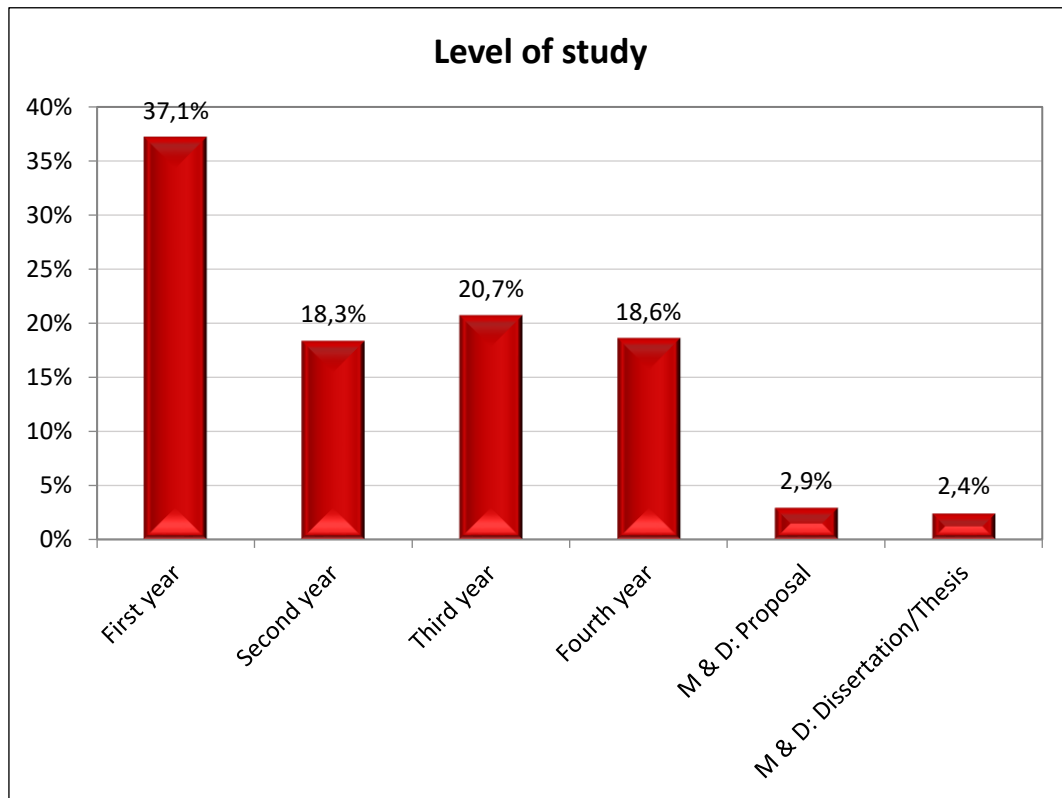


Figure 4.8: Level of study of participants (n=377)

Figure 4.8 displays that most of the participants (37.1%) (n=140) were in their first year of study, 18.3% (n=69) were at second year level, 20.7% (n=78) were in their third year, and 18.6% (n=70) were at fourth year level, while 5.3% (n=20) were master's or doctoral (M & D) students registered for proposal and dissertation/thesis writing. It may be concluded that the highest proportion of the participants (37.1%) were registered at first year level. The sample is not generalised to the EC student population and the Unisa student population as such statistics were not available.

The level of study information will be useful when planning for student support programmes.

4.3.2.3 College of study in which students are currently registered

The college of study that the participants are registered in is shown in Figure 4.9.

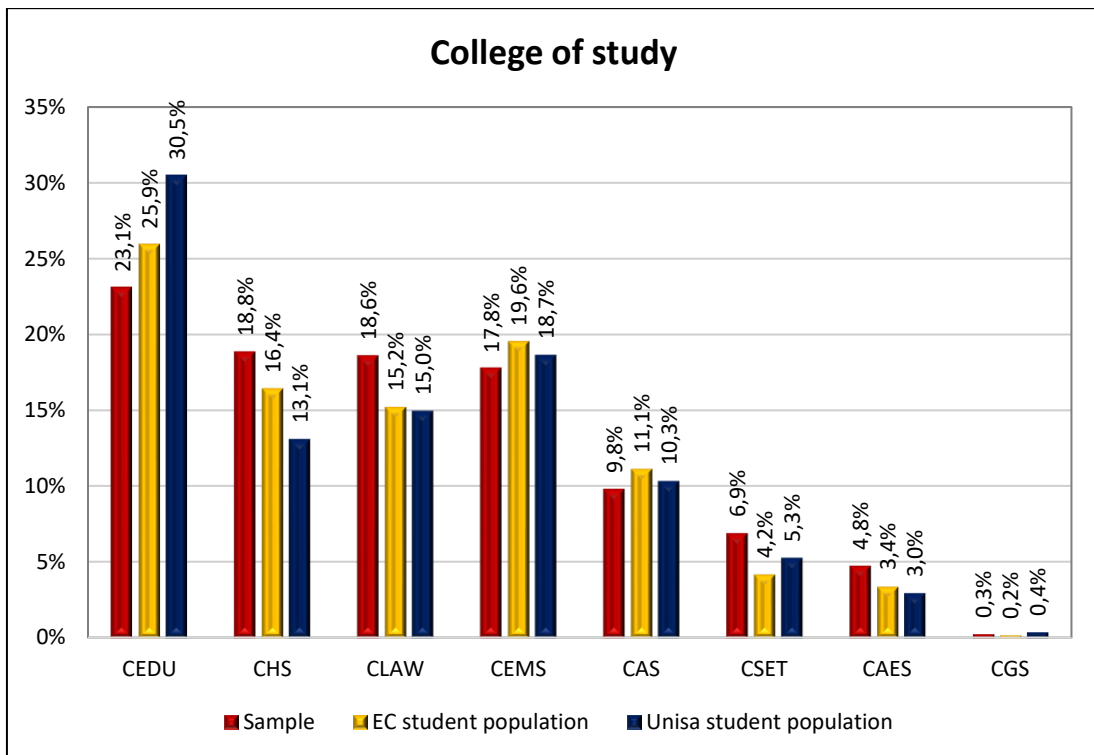


Figure 4.9: College of study in terms of current registration (n=377)

Figure 4.9 reflects that the highest proportion of participants, 23.1% (n=87), were registered in the College of Education (CEDU), 18.8% (n=71) were in the College of Human Sciences (CHS), 18.6% (n=70) in the College of Law (CLAW) and 17.8% (n=67) were registered in the College of Economics and Management Sciences (CEMS). Furthermore, 9.8% (n=37) were registered in the College of Accounting Sciences (CAS), 6.9% (n=26) in the College of Science, Engineering and Technology (CSET), 4.8% (n=18) in the College of Agriculture and Environmental

Sciences (CAES) and only 0.3% (n=1) of students were registered in the College of Graduate Studies (CGS).

Similar patterns are found in the EC Unisa student population, where the majority of the students were registered in CEDU (25.9%), CEMS (19.6%), CHS (16.4%) and CLAW (15.2%). Similarly, in the entire Unisa population, the majority of the students were registered in the CEDU (30.5%), CEMS (18.7%), CLAW (15.0%) and CHS (13.1%) (Unisa, 2019b). It may therefore be concluded that the sample was representative of the EC Unisa student population and that of the entire Unisa student population as the colleges in which most of the students were registered were the CEDU, CEMS, CLAW and CHS.

4.3.2.4 Regional office closest to participants

Participants from all three Unisa regional offices in the EC participated in the study and Figure 4.10 illustrates the regional office that is closest to the participants.

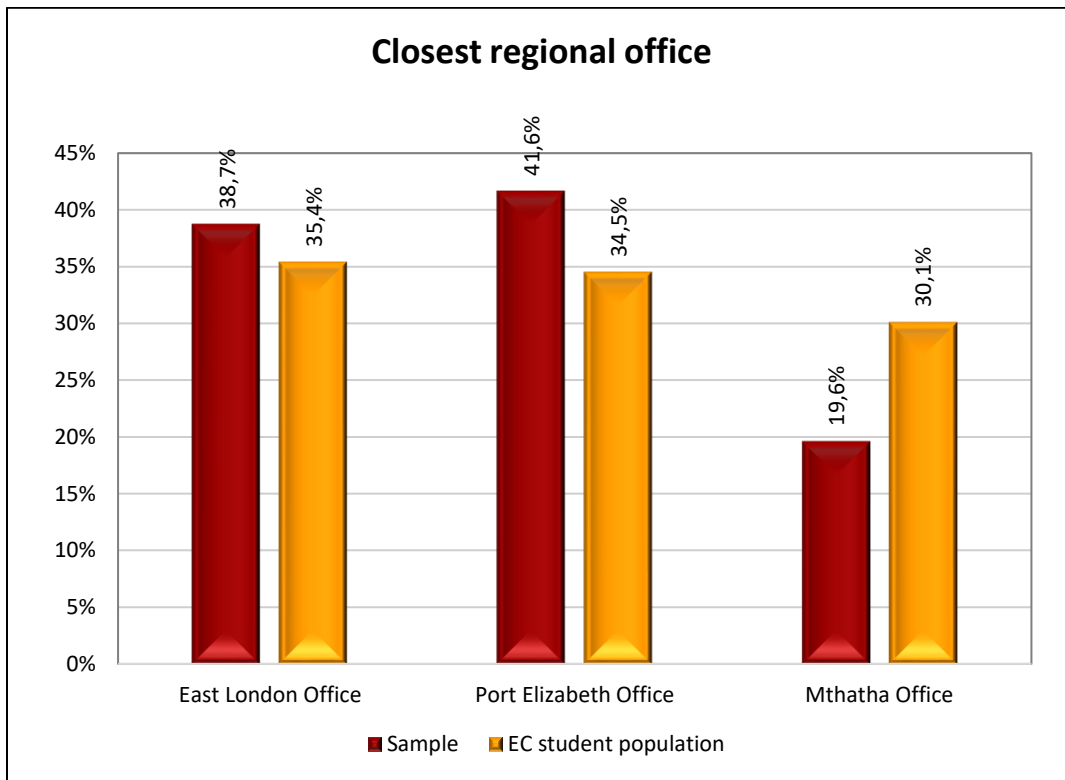


Figure 4.10: Regional office closest to participants (n=377)

Figure 4.10 depicts that the Port Elizabeth office constitutes 41.6% (n=157) of the participants, while 38.7% (n=146) were from the East London office and 19.6% (n=74) were from the Mthatha Office.

In regard to the number of students at each EC office, therefore, East London has 35.4% of the total, Port Elizabeth has 34.5% and Mthatha has 30.1% of the total number of students (Unisa, 2019b). It may be noted that although the Port Elizabeth office had more participants who completed the survey, the sample was a fair reflection of the EC Unisa student population where the East London and Port Elizabeth offices have more students than the Mthatha office.

4.3.2.5 Prior computer training or computer experience

Figure 4.11 indicates whether the participants had any computer training or computer experience prior to registering at Unisa.

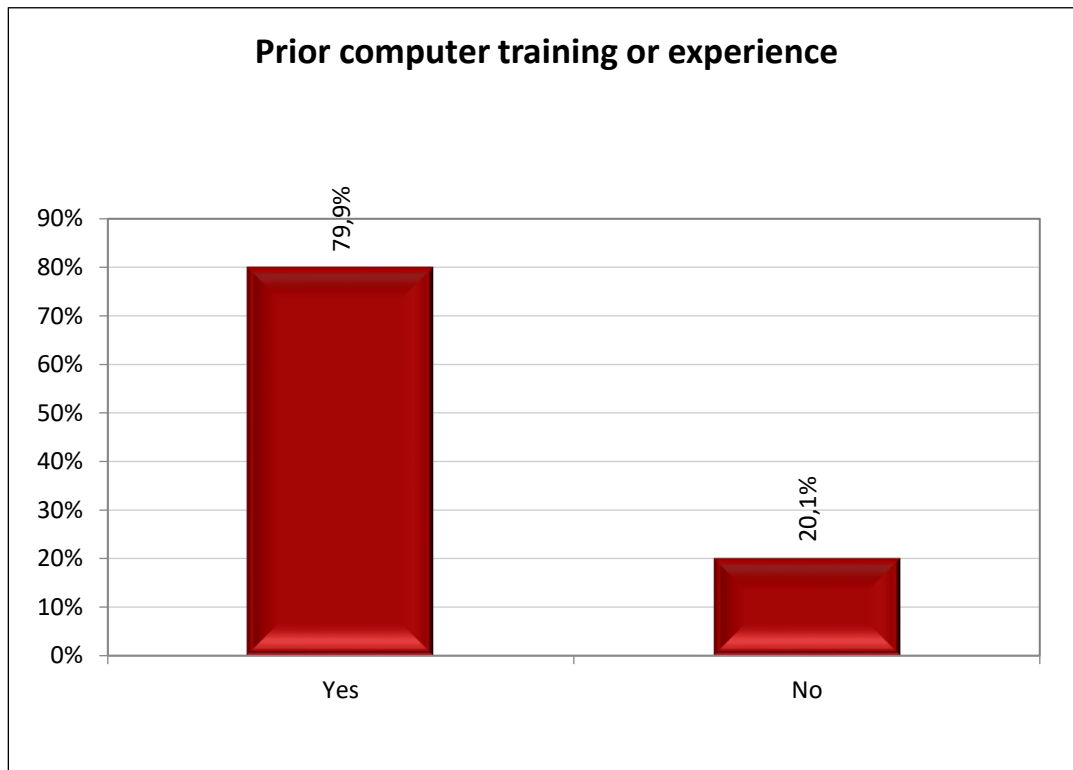


Figure 4.11: Prior computer training or computer experience (n=324)

Figure 4.11 illustrates that most of the participants (79.9%; n=259) indicated that they had had computer training or computer experience prior to registering at Unisa, while 20.1% (n=65) had had no computer training or computer experience prior to registering at Unisa. Only 324 participants responded to this question with a missing value of 53. It may be concluded that most of the participants have some form of computer training or computer experience prior to registering at Unisa.

In summary, at the time of data collection, the socio-demographic and academic characteristics of the study can be generalised to the EC student population and the Unisa student population, with the majority of the students being female, most students being employed, and the majority of the students being registered for an undergraduate degree qualification. Further, the following colleges have the greatest numbers of registered students: CEDU, CEMS, CLAW and CHS. The study is proportionately representative of the three offices with East London office having the greatest number of students, followed by the Port Elizabeth office and with Mthatha office having the lowest number of students in the EC region.

The language profile of the study is generalised to the EC student population and the EC province with Xhosa being the most common home language, followed by English and then Afrikaans. The results could not be generalised to the Unisa student population as Zulu was the most common home language spoken in the Unisa student population. The living environment of the participants could not be generalised to the EC province as most of the participants were from the urban living environment whereas most of the EC population is in a rural living environment.

4.4 DESCRIPTIVE STATISTICS RELATED TO RESEARCH OBJECTIVES

To meet the aim and objectives of the study, descriptive statistics were conducted on the following variables: perceived DL competencies, attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops.

4.4.1 Perceived DL competencies

The participants were asked to rate their perceived DL competencies. Their perceived DL competencies were rated on a five-point Likert scale that ranged from 1 (very poor) to 5 (excellent).

The participants' self-reported perceived DL competencies are indicated in Table 4.2. There were 12 items that were used to measure the participants' perceived DL competencies, question 11a to question 11l of the questionnaire (see Appendix B). Only 324 participants responded to these questions with a missing value of 53. The following Likert scales were used in Table 4.2: 5 = Excellent, 4 = Good, 3 = Average, 2 = Poor, 1 = Very Poor. The mean and standard deviation (SD) are also reported. The mean, as a measure of central tendency, was used to calculate the average of the data. The SD is the dispersion or spread of the data from the mean (McMillan & Schumacher, 2010). A low SD indicates that the data are close to the mean and a high SD indicates that the data are dispersed away from the mean (Field, 2013).

Table 4.2: Participants' perceived DL competencies (n=324)

Statement	Level of competency					Mean	SD
	5	4	3	2	1		
Q11e. My Internet skills (ability to use the Internet) are:	40.1% (130)	44.8% (145)	12.0% (39)	2.8% (9)	.3% (1)	4.22	.79
Q11f. My ability to find relevant information on the Internet is:	36.1% (117)	50.0% (162)	11.7% (38)	2.2% (7)	0.0% (0)	4.20	.73
Q11i. My online communication skills (emails, discussion forums, social media) are:	34.6% (112)	45.4% (147)	17.9% (58)	2.2% (7)	0.0% (0)	4.12	.77
Q11b. My computer skills (ability to use computers) are:	28.7% (93)	48.8% (158)	18.8% (61)	3.4% (11)	.3% (1)	4.02	.80
Q11c. My digital literacy skills (ability to use information and communication technologies to evaluate information) are:	23.5% (76)	49.7% (161)	21.3% (69)	5.2% (17)	.3% (1)	3.91	.82
Q11a. My typing skills are:	22.2% (72)	46.3% (150)	26.5% (86)	4.3% (14)	.6% (2)	3.85	.83
Q11j. My ability to multi-task using technology is:	22.2% (72)	43.5% (141)	24.4% (79)	9.3% (30)	.6% (2)	3.77	.92

Statement	Level of competency					Mean	SD
	5	4	3	2	1		
Q11d. My ability to protect my information using technology is:	15.1% (49)	42.6% (138)	32.4% (105)	9.0% (29)	.9% (3)	3.62	.88
Q11l. My ability to solve problems using the technology is:	18.5% (60)	33.3% (108)	38.6% (125)	8.3% (27)	1.2% (4)	3.6	.92
Q11k. My ability to create, edit, organise, integrate and present digital content is:	16.4% (53)	34.6% (112)	35.2% (114)	12% (39)	1.9% (6)	3.52	.97
Q11h. My usage of media format skills (video, audio, text and graphics) is:	16.7% (54)	33.0% (107)	35.5% (115)	11.1% (36)	3.7% (12)	3.48	1.02
Q11g. My ability to use cloud computing (store and manage information saved on a remote server) is:	11.4% (37)	29.6% (96)	37.3% (121)	16.4% (53)	5.2% (17)	3.26	1.03

From Table 4.2, it emerged that 84.9% of the participants indicated that their Internet skills (ability to use the Internet) were either excellent or good ($\bar{x} = 4.22, SD = .79$); 86.1% said that their ability to find relevant information on the Internet is either excellent or good ($\bar{x} = 4.20, SD = .73$); 80% said that their online communication skills (emails, discussion forums, social media) is at least good ($\bar{x} = 4.12, SD = .77$); 77.5% indicated that their computer skills (ability to use computers) are either excellent or good ($\bar{x} = 4.02, SD = .80$); and 73.2% said that they have DL skills (ability to use information and communication technologies to evaluate information) ($\bar{x} = 3.91, SD = .82$).

To determine the overall value of the perceived DL competencies of the participants, a composite score was calculated. A composite score is calculated when there are multiple items for one variable. The composite score allows the researcher to obtain one value which represents the variable and this value can be used for further statistical procedures. To calculate the composite score of the perceived DL competencies, each participant's score from questions Q11a to Q11l was added and then divided by the number of questions (i.e. 12 items). On average, participants scored 3.80 on perceived DL competencies scale. The mean of this composite variable is shown in Table 4.3.

Table 4.3: Mean and median of the perceived DL competencies composite score

		Digital_literacy
N	Valid	324
	Missing	53
Mean		3.7968
Median		3.8333

Thereafter, the distribution of the DL competencies composite score was examined, in order to determine which inferential technique would be better suited to answer

the research questions (i.e., non-parametric or parametric). To determine such, the Kolmogorov–Smirnov test statistic was inspected. The Kolmogorov–Smirnov test determines whether a distribution of scores is normally distributed or not (Field, 2013). As per table 4.4, the results revealed that the composite perceived DL score, $D(324) = 0.07$, $p < .05$, was significantly non-normal. Therefore, the researcher adopted non-parametric techniques.

Table 4.4: Kolmogorov–Smirnov

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Composite perceived DL	.065	324	.002	.976	324	.000
a. Lilliefors Significance Correction						

To determine whether the perceived DL competencies were high or low, the median was calculated. The median is the middle value of all the responses and allows the responses to be divided into two equal parts or groups. The median for the perceived DL competencies stood at 3.83, as seen in Table 4.3 above.

This median of 3.83, as per Table 4.3, was then used to determine whether the participants' perceived DL competencies were considered high or low. All values equal to or above the median were categorised as high perceived DL competencies and the values below the median were categorised as low perceived DL competencies. The participants' perceived DL competencies are shown in Table 4.5.

Table 4.5: Perceived DL competencies of participants

Perceived DL competencies of participants					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Low	151	40.1	40.1	40.1
	High	226	59.9	59.9	100.0
	Total	377	100.0	100.0	

From Table 4.5, it can be seen that the majority of the participants (59.9%) perceived themselves to have high DL competencies and 40.1% of the participants perceived themselves to have low DL competencies.

4.4.2 Research objective 1: To determine students' attitudes towards using DT for educational purposes

The participants were asked to rate their level of attitudes towards DT. The attitudes towards DT were rated on a five-point Likert scale that ranged from 1 (not to any extent at all) to 5 (to a very large extent).

4.4.2.1 Attitude towards DT for educational purposes

Table 4.6 shows the participants' levels of attitude towards DT. The participants were given 13 items to assess their attitudes towards DT, question 20a to question 20m of the questionnaire (see Appendix B). The following Likert scales were used in Table 4.6: 5 = to a very large extent, 4 = to a large extent, 3 = to some extent, 2 = to a little extent, 1 = not to any extent at all. The mean and SD were also reported.

Table 4.6: Attitude towards DT for educational purposes (n=307)

Statement	Level of attitudes					Mean	SD
	5	4	3	2	1		
Q20d. I feel confident to upload my assignments on myUnisa.	69.7% (214)	20.2% (62)	8.1% (25)	1.6% (5)	.3% (1)	4.57	.74
Q20c. I am confident typing my assignments on the computer.	64.2% (197)	23.5% (72)	9.8% (30)	2.3% (7)	.3% (1)	4.49	.79
Q20f. I feel confident to search for information on the Internet.	57.% (175)	30.6% (94)	9.8% (30)	2.3% (7)	.3% (1)	4.42	.79
Q20b. I am confident using the computer for my study purposes.	54.7% (168)	30.0% (92)	11.7% (36)	3.3% (10)	.3% (1)	4.36	.84
Q20a. I enjoy working on the computer.	48.2% (148)	32.6% (100)	17.6% (54)	.7% (2)	1.0% (3)	4.26	.84
Q20k. I think my learning can be enhanced by using technology.	40.1% (123)	37.8% (116)	18.2% (56)	3.6% (11)	.3% (1)	4.14	.86

Statement	Level of attitudes					Mean	SD
	5	4	3	2	1		
Q20g. I am comfortable using the different software programs for my studies.	33.6% (103)	29.3% (90)	25.4% (78)	9.4% (29)	2.3% (7)	3.82	1.07
Q20e. I feel my information is safe on the computer.	28.3% (87)	33.2% (102)	28.7% (88)	6.5% (20)	3.3% (10)	3.77	1.04
Q20m. I believe that I have sufficient digital literacy skills to cope confidently in the working world.	26.7% (82)	29.3% (90)	30.6% (94)	11.1% (34)	2.3% (7)	3.67	1.06
Q20j. I enjoy using the discussion forums and other online forums.	19.9% (61)	22.8% (70)	30.3% (93)	18.2% (56)	8.8% (27)	3.27	1.22
Q20h. I enjoy reading my study material on the computer.	17.3% (53)	17.9% (55)	27.0% (83)	23.1% (71)	14.7% (45)	3.00	1.30
Q20l. I feel that I need training in digital literacy.	18.6% (57)	12.7% (39)	31.6% (97)	19.5% (60)	17.6% (54)	2.95	1.33
Q20i. I am confident using the online library.	17.3% (53)	16.6% (51)	27.0% (83)	20.2% (62)	18.9% (58)	2.93	1.35

Table 4.6 shows that the following six items have a mean of over 4, indicating that the majority of the participants agreed to a large extent with these items:

- I feel confident to upload my assignments on myUnisa (89.9%), ($\bar{x} = 4.57, SD = .74$)
- I am confident typing my assignments on the computer (87.7%), ($\bar{x} = 4.49, SD = .79$)
- I feel confident to search for information on the Internet (87.6%), ($\bar{x} = 4.42, SD = .79$)
- I am confident using the computer for my study purposes (84.7%), ($\bar{x} = 4.36, SD = .84$)
- I enjoy working on the computer (80.8%), ($\bar{x} = 4.26, SD = .84$) and
- I think my learning can be enhanced by using technology (77.9%), ($\bar{x} = 4.14, SD = .86$)

It is noteworthy that the majority of the participants were quite confident in uploading and typing assignments, searching for information on the Internet and using the computer for study purposes and working on it. The participants indicated to a large extent (62.9%), ($\bar{x} = 3.82, SD = 1.07$), that they are comfortable using different software programs in their studies, 61.5%, ($\bar{x} = 3.77, SD = 1.04$) indicated that they feel that their information is safe on the computer, and 56%, ($\bar{x} = 3.67, SD = 1.06$) believed that they have sufficient DL skills to cope confidently in the working world.

The majority of the participants did not agree to a large extent with the following items:

- I enjoy using the discussion forums and other online forums (42.7%), ($\bar{x} = 3.27, SD = 1.22$)

- I enjoy reading my study material on the computer (35.2%), ($\bar{x} = 3.00, SD = 1.30$)
- I feel that I need training in DL (31.3%), ($\bar{x} = 2.95, SD = 1.33$)
- I am confident using the online library (33.9%), ($\bar{x} = 2.93, SD = 1.35$)

It is noted that the participants do not enjoy the discussion and other online forums, reading of study material on the computer and that they were not confident in using the online library. They have also indicated that they required DL training. Student support programmes will be discussed further in Chapter 5.

To determine the overall value of attitude towards DT for educational purposes of the participants, a composite score was calculated. To calculate the composite score of the attitude towards DT for educational purposes, each participants' score from questions Q20a to Q20m was added and then divided by the number of questions (i.e. 13 items). On average, participants scored 3.89 for attitude towards DT for educational purposes. The mean of this composite variable is shown in Table 4.7.

Table 4.7: Composite score of attitudes towards DT for educational purposes

		Attitudes towards DT
N	Valid	307
	Missing	70
Mean		3.8914

The mean score for attitude towards DT for educational purposes stood at 3.89 as indicated in Table 4.7. This composite score was used to test the hypotheses, discussed under 4.5.2.

4.4.3 Research objective 2: To investigate the extent to which students use the Unisa LMS

The majority of the participants, 99.7% (n=289), indicated that they were registered on myUnisa, the LMS used at Unisa, and only one participant (0.3%) indicated that he/she was not registered on myUnisa. The anomaly of this one participant that was not registered on myUnisa is noted and the possibility exists that the participant was only registered for myLife and not myUnisa or that the participant answered the question incorrectly.

The participants were further asked to rate the extent of their activities performed on myUnisa. The activities were rated on a six-point Likert scale that ranged from 1 (not to any extent at all) to 6 (do not use myUnisa at all).

4.4.3.1 Utilisation of activities on myUnisa

The participants' utilisation of activities on myUnisa is indicated in Table 4.8. The participants were given 9 items to indicate the activities they perform on myUnisa, question 31a to question 31i of the questionnaire (see Appendix B). For reporting purposes, the Likert scale was converted to 5 scales, in which the Likert scale values of 1 (not to any extent at all) and 6 (do not use myUnisa at all) were combined and reflected under 1 (not to any extent at all). The following Likert scales were used in Table 4.8: 5 = to a very large extent, 4 = to a large extent, 3 = to some extent, 2 = to a little extent, 1 = not to any extent at all. A missing value of 87 is reported as 290 participants completed this section. The mean and SD were also reported.

Table 4.8: Utilisation of activities on myUnisa (n=290)

Statement	Level of LMS usage					Mean	SD
	5	4	3	2	1		
Q31e. Upload assignments	73.8% (214)	9.7% (28)	4.1% (12)	1.4% (4)	11.0% (32)	4.34	1.31
Q31i. Monitor examination results	72.8% (211)	11.0% (32)	3.8% (11)	.7% (2)	11.7% (34)	4.32	1.32
Q31c. Download study material	63.4% (184)	16.9% (49)	9.0% (26)	3.1% (9)	7.6% (22)	4.26	1.21
Q31h. Monitor assignment results	69.0% (200)	12.8% (37)	5.2% (15)	1.4% (4)	11.7% (34)	4.26	1.34
Q31d. Download examination papers	63.8% (185)	14.8% (43)	4.8% (14)	4.8% (14)	11.7% (34)	4.14	1.39
Q31f. Discussion forums	28.6% (83)	21.4% (62)	25.5% (74)	10.3% (30)	14.1% (41)	3.40	1.37
Q31b. Edit registration	18.6% (54)	11.0% (32)	19.3% (56)	22.1% (64)	29.% (84)	2.68	1.47
Q31g. eTutor support	12.1% (35)	13.4% (39)	23.1% (67)	17.9% (52)	33.4% (97)	2.53	1.39
Q31a. Change personal details	11.4% (33)	6.2% (18)	17.2% (50)	34.5% (100)	30.7% (89)	2.33	1.28

Table 4.8 indicates that the majority of the participants (83.5%) uploaded assignments at least to a large extent, using the institution's LMS ($\bar{x} = 4.34, SD =$

1.31); 83.8% of the participants monitored examination results to a large extent ($\bar{x} = 4.32, SD = 1.32$); 80.3% indicate that they downloaded study material ($\bar{x} = 4.26, SD = 1.21$); 81.8% indicate that they monitored assignment results to at least a large extent ($\bar{x} = 4.26, SD = 1.34$); 78.6% downloaded examination papers ($\bar{x} = 4.14, SD = 1.39$) and 50% used discussion forums to a large extent ($\bar{x} = 3.40, SD = 1.37$). It is noteworthy that the activities mostly performed on myUnisa were uploading assignments, monitoring examination results, downloading study material, monitoring assignment results, downloading examination papers and to some extent using discussion forums.

Less frequently used activities on myUnisa include the following: editing registration (29.6%), ($\bar{x} = 2.68, SD = 1.47$); eTutor support (25.5%); ($\bar{x} = 2.53, SD = 1.39$) and changing personal details (17.6%); ($\bar{x} = 2.33, SD = 1.28$).

To determine the overall value of the usage of the LMS by the participants, a composite score was calculated. To calculate the composite score of the usage of the LMS, each participant's score from questions Q31a to Q31i was added and then divided by the number of questions (i.e. 9 items). The mean of this composite variable is shown in Table 4.9.

Table 4.9: Composite score of the usage of the LMS

		Usage of the LMS
N	Valid	290
	Missing	87
Mean		3.6761

The mean for the usage of the LMS composite variable stood at 3.68 as indicated in Table 4.9. The composite score of the usage of the LMS was used for the hypotheses testing discussed under 4.5.2.

Table 4.8 shows that the participants were using the LMS mainly for academic related purposes. It is important to note that students were not using myUnisa for administrative purposes (editing of registration and changing of personal details), and neither were they using the eTutor support programme to a large extent. Student support programmes will be discussed further in Chapter 5.

4.4.4 Research objective 3: To determine whether students attend regional DL workshops in the EC

Descriptive statistics were used to determine whether students attended regional DL workshops. The participants were asked to indicate whether they had attended the DL workshops offered at the regional offices.

4.4.4.1 Attendance at regional DL workshops

Figure 4.12 indicates the attendance at the six DL workshops that were offered at the regional offices. A missing value of 100 is reported as only 277 participants responded to this section.

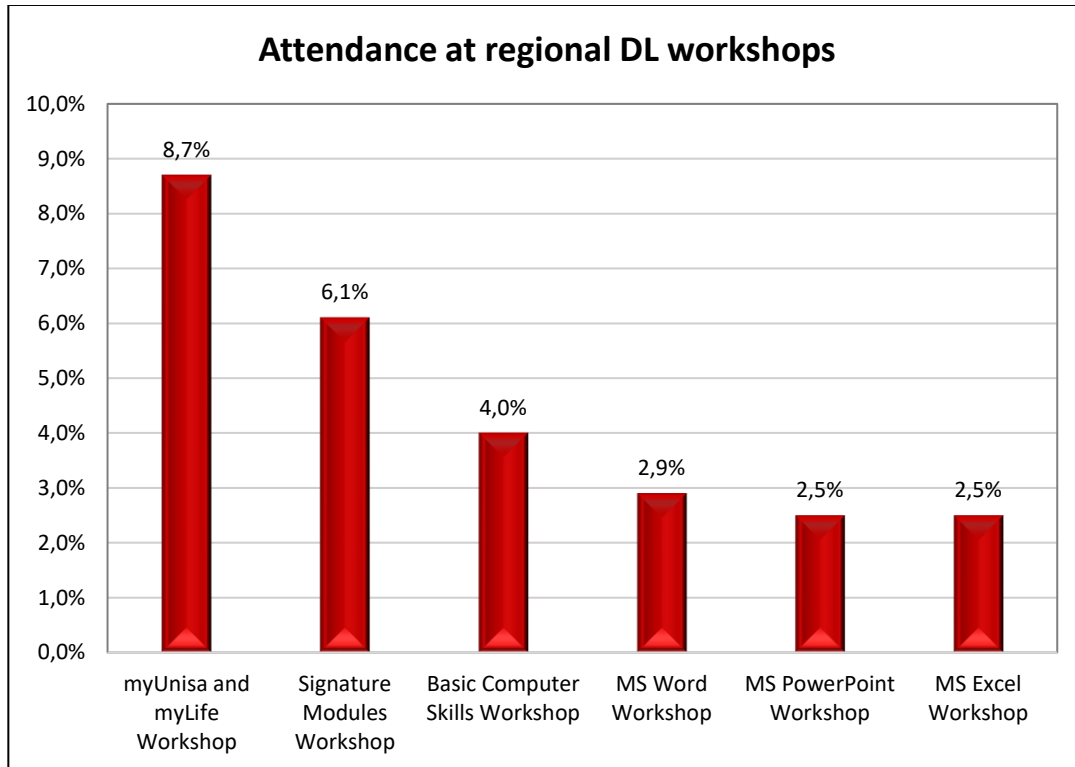


Figure 4.12: Attendance at DL regional workshops (n=277)

Figure 4.12 reflects that the proportion of participants who attended regional DL workshops was low. The proportion of the participants who attended regional DL workshops was 8.7% for myUnisa and myLife, 6.1% for the Signature Module workshop, 4.0% for basic computer skills, 2.9% for MS Word, and 2.5% for both MS PowerPoint and MS Excel. Marketing strategies as discussed in Chapter 5 should improve the attendance at regional DL workshops.

4.5 INFERENCEAL STATISTICS

Inferential statistics were performed to determine whether there were any statistically significant relationships/associations between the variables. Inferential statistics were performed to meet objective 4, to examine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies. Inferential statistics were also performed to meet objective 5, to examine whether there is a statistically significant relationship between students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops and perceived DL competencies.

In order to meet objective 4, a Pearson's chi-squared test of association was employed to examine whether there was any statistically significant association(s) between the socio-demographic and academic characteristics of the participants and the students' perceived DL competencies.

To meet objective 5 and to test the hypotheses, Kendall's tau correlation coefficient analysis was used to examine whether there was a statistically significant relationship between the students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops and the perceived DL competencies.

4.5.1 Research objective 4: To examine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies

Pearson's chi-square test of association is a non-parametric test used to examine the association or relationship between two nominal and/or ordinal variables (McMillan & Schumacher, 2010; Maree, 2011). The Pearson's chi-squared test was

used to test the association(s) between the socio-demographic and academic characteristics of the participants and the perceived DL competencies. The degree of freedom (df) is the number of values or observations that can be assigned when performing statistical calculations (McMillan & Schumacher, 2010; Saunders et al., 2012). The degree of freedom is calculated by subtracting 1 from the number of options that the participant had to choose from. The 5% level of significance was used to perform the test. The relationship between the variables was regarded as statistically significant with the p-value less than 0.05.

4.5.1.1 Statistical association between age and perceived DL competencies

Table 4.10 shows the cross-tabulation of the frequency distribution of the age of the participants and their perceived DL competencies as indicated in Table 4.5.

Table 4.10: Age-perceived DL competencies cross-tabulation (n=377)

Crosstab									
		Age category							Total
		18 – 24 years	25 – 29 years	30 – 34 years	35 – 39 years	40 – 44 years	45 – 49 years	50+ years	
DL_HI _LO	Low	28.3% (13)	38.3% (36)	32.4% (22)	38.0% (27)	48.1% (26)	57.1% (12)	65.2% (15)	40.1% (151)
	High	71.7% (33)	61.7% (58)	67.6% (46)	62.0% (44)	51.9% (28)	42.9% (9)	34.8% (8)	59.9% (226)
Total		100.0% (46)	100.0% (94)	100.0% (68)	100.0% (71)	100.0% (54)	100.0% (21)	100.0% (23)	100.0% (377)

Table 4.10 indicates that the majority of the participants (71.7%) in the age category of 18 – 24 years had high perceived DL competencies as opposed to the majority of the participants (65.2%) in the age category of 50+ years who had low perceived DL competencies. Furthermore, it is worth noting that the number of participants with

low perceived DL competencies increases as the age category increases, while the number of participants with high perceived DL competencies decreases as the age category increases. This indicates that older students reported lower perceived DL competencies than younger students and that their perceived DL competencies decrease with age.

The chi-square test results between the age of the participants and their perceived DL competencies are indicated in Table 4.11, $\chi^2(6) = 14.68$, $p < .05$.

Table 4.11: Chi-square tests: age-perceived DL competencies (n=377)

Chi-square tests			
	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	14.679 ^a	6	.023
N of valid cases	377		
a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 8.41.			

Table 4.11 indicates that there is a statistically significant association between the age of the participants and their perceived DL competencies ($\chi^2(6) = 14.68$; $p = .02$).

4.5.1.2 Association between prior computer training or computer experience and perceived DL competencies

The cross tabulation of the participants' prior computer training or computer experience and perceived DL competencies is shown in Table 4.12.

Table 4.12: Prior computer training or computer experience – perceived DL competencies cross-tabulation (n=324)

Crosstab				
		Did you have any computer training or computer experience prior to registering at Unisa?		Total
		No	Yes	
DL_HI_LO	Low	70.8% (46)	40.5% (105)	46.6% (151)
	High	29.2% (19)	59.5% (154)	53.4% (173)
Total		100.0% (65)	100.0% (259)	100.0% (324)

The majority of the participants (70.8%) as indicated in Table 4.12, who did not have any computer training or computer experience prior to registering at Unisa demonstrated low perceived DL competencies; as opposed to the majority of the participants (59.5%) who had computer training or computer experience prior to registering at Unisa and have high perceived DL competencies. Prior computer training or computer experience is therefore clearly associated with the DL competencies of the participants.

The chi-square test results are indicated in Table 4.13.

Table 4.13: Chi-square tests: Prior computer training or computer experience – perceived DL competencies (n=324)

Chi-square tests					
	Value	df	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	19.080 ^a	1	.000		
N of valid cases	324				
a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 30.29.					
b. Computed only for a 2x2 table					

Table 4.13 indicates that there is a statistically significant association between the participant's prior computer training or computer experience and the perceived DL competencies ($\chi^2(1) = 19.08; p < .001$).

A statistically significant association was found between the age of the participants and their perceived DL competencies. Additionally, a statistically significant association was found between the participants' prior computer training or computer experience and their perceived DL competencies. All other socio-demographic and academic characteristics of the participants showed insignificant associations.

4.5.2 Hypothesis testing to meet research objective 5: To examine whether there is a statistically significant relationship between students' attitudes towards DT, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies

The extent of the statistical relationship between the variables was assessed using non-parametric correlation coefficients. Non-parametric tests are used when data are not normally distributed (Saunders et al., 2012; Field, 2013). The Kendall's tau correlation coefficient was used to determine the relationship between the dependent variable (perceived DL competency) and the independent variables: attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops. Although there are two non-parametric options (i.e., Spearman's rho and Kendall's tau), the Kendall's tau correlation coefficient produces a more accurate representation of the correlation in the population when compared to the Spearman's rho correlation coefficient (Field, 2013). As such, the Kendall's tau correlation coefficient was adopted for the current analysis.

The correlation coefficient (τ) is used to measure the relationship between two variables and the strength is measured from -1 to 1 with 0 representing no correlation (Collis & Hussey, 2009; Field, 2013). A positive correlation is reported when both variables increase together or both variables decrease together. A negative correlation is reported when one variable decreases as the second variable increases, or vice versa. The size of the correlation coefficient determines the strength and the direction of the relationship between the variables. Collis and Hussey (2009) state that where $\tau = 0$ to 0.39 there is a low positive correlation; 0.4 to 0.69 is a medium positive correlation; 0.7 to 0.89 is high positive correlation; 0.9 to 0.99 is a very high positive correlation.

The 5% level of significance was used to perform the test. A statistically significant correlation is realised if the p-value was less than .05 and a statistically highly significant correlation was reported if the p-value is less than .01. Table 4.14 below reflects the Kendall's tau correlation coefficients derived from the current analysis.

Table 4.14: Correlation coefficient analysis report

Correlations						
			Digital literacy	Attitudes	LMS usage	Attendance
Kendall's tau_b	Digital literacy	Correlation coefficient	1.000	.420**	.115**	.150**
		Sig. (1-tailed)	.	.000	.002	.000
		N	324	307	290	277
	Attitudes	Correlation coefficient	.420**	1.000	.238**	.128**
		Sig. (1-tailed)	.000	.	.000	.002
		N	307	307	290	277
	LMS usage	Correlation coefficient	.115**	.238**	1.000	.005
		Sig. (1-tailed)	.002	.000	.	.458
		N	290	290	290	277
	Attendance	Correlation coefficient	.150**	.128**	.005	1.000
		Sig. (1-tailed)	.000	.002	.458	.
		N	277	277	277	277
**. Correlation is significant at the 0.01 level (1-tailed).						

H1₀: There is no statistically significant relationship between attitudes towards DT for educational purposes and perceived DL competencies.

From Table 4.14, it can be seen that attitude towards DT for educational purposes was significantly correlated ($\tau = .42$; $p < .001$) with perceived DL competencies. The correlation was positive in nature and moderate in strength. As such, the null hypothesis, stating that there is no statistically significant relationship between attitudes towards DT for educational purposes and perceived DL competencies, was rejected.

H2₀: There is no statistically significant relationship between the usage of the LMS and perceived DL competencies.

The correlation analysis results in Table 4.14 show that the usage of the LMS was significantly correlated ($\tau = .12$; $p = .002$) with perceived DL competencies. The correlation was positive in nature, but weak in strength. The test is statistically significant, and the results therefore reject the null hypothesis, there is no statistically significant relationship between the usage of the LMS and perceived DL competencies.

H3₀: There is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.

Table 4.14 shows the correlation analysis results where attendance at DL workshops at the regional offices was statistically correlated ($\tau = .15$; $p < .001$) with perceived DL competencies. The correlation was positive in nature but weak in strength. As such, the null hypothesis, there is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies, was rejected.

The summary of the hypotheses is presented in Table 4.15.

Table 4.15: Summary of the hypotheses

Hypotheses		Result
<i>H1₀:</i>	<p>There is no statistically significant relationship between attitudes towards DT for educational purposes and perceived DL competencies.</p> <p>The null hypothesis was rejected; attitude towards DT for educational purposes exhibits a moderate positive correlation with perceived DL competencies.</p>	Rejected
<i>H2₀:</i>	<p>There is no statistically significant relationship between usage of the LMS and perceived DL competencies.</p> <p>The null hypothesis was rejected; usage of the LMS exhibits a weak positive correlation with perceived DL competencies.</p>	Rejected
<i>H3₀:</i>	<p>There is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.</p> <p>The null hypothesis was rejected; attendance at regional DL workshops exhibits a weak positive correlation with perceived DL competencies.</p>	Rejected

4.6 CONCLUSION

This chapter reported on the descriptive statistics in the form of frequency analysis on the socio-demographic and the academic characteristics of the participants. Thereafter the perceived DL competencies, attitudes towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops were analysed using descriptive statistics. The composite scores were calculated for each of the constructs that were used to test the hypotheses: the perceived DL competencies, attitude towards DT for educational purposes and usage of the LMS. The composite scores were calculated by adding the scores of all the questions for each of the variables and then dividing the total by the number of questions (items). Furthermore, the median was calculated to determine whether the perceived DL competencies were high or low. The study found that the majority of the participants (59.9%) had high perceived DL competencies.

Inferential statistics, namely Pearson's chi-squared tests were used to determine the association(s) between the socio-demographic and academic characteristics of the participants and the perceived DL competencies. The study revealed that both the age of the participants and the participant's prior computer training or computer experience had a statistically significant association with the perceived DL competencies. No statistically significant associations were found between the other socio-demographic variables and the perceived DL competencies.

The results reveal that the correlation between attitudes towards DT for educational purposes and perceived DL competencies was positive in nature and moderate in strength; the correlation between the usage of the LMS and perceived DL competencies was positive in nature but weak in strength and the correlation between attendance at regional DL workshops and perceived DL competencies was positive in nature and weak in strength. The results show that the null hypotheses were rejected in all cases.

Chapter 5 discusses the interpretation of these results, conclusions, limitations and delimitations of the study and recommendations for practice and policy and future research studies. The recommended DL workshop programme is presented.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter reveals the findings and conclusions of the study carried out to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA. Recommendations for practice and policy are presented, followed by suggestions for further research studies. The chapter concludes with the contribution of this study and the limitations and delimitations of this study.

5.2 RESEARCH DESIGN AND METHODOLOGY

This study followed the positivist paradigm using a quantitative, cross-sectional survey for descriptive and correlation analysis. The aim of this study was to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA. The study comprised five main objectives:

1. To determine students' attitudes towards using DT for educational purposes.
2. To investigate the extent to which students use the Unisa LMS.
3. To determine whether students attend regional DL workshops in the EC.
4. To examine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies.
5. To examine whether there is a statistically significant relationship between students' attitudes towards DT, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies.

The above objectives were formulated to address the following research sub-questions:

1. What are students' attitudes towards using DT for educational purposes?
2. To what extent do students use the Unisa LMS?
3. Do students attend DL workshops in the EC region?
4. Is there a statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies?
5. Is there a statistically significant relationship between students' attitudes towards DT, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies?

5.3 SUMMARY AND INTERPRETATION OF THE RESEARCH FINDINGS

The online survey was sent to the entire EC population of 18 038 students. A low response rate of 381 (2%) was received, and of these, 377 responses were used for the analysis of data while 4 responses were incomplete and excluded from the analysis.

5.3.1 Socio-demographic and academic characteristics

Most of the participants were females (63.7%) and the majority of the participants (24.9%) were aged between 25 and 29 years. Xhosa was the most spoken home language (60%). Most of the participants (70.3%) were in some form of employment and lived in an urban environment (69.5%), with the closest regional office being Port Elizabeth (41.6%).

Overall, 76.1% of the participants were registered for an undergraduate qualification and most of these (41.9%) were registered for a degree qualification. The

participants were mainly from the CEDU (23.1%). Most of the participants (79.9%) had some form of computer training or computer experience prior to registering at Unisa (see Figures 4.1 to 4.10).

5.3.2 The perceived DL competencies

The participants were asked to rate their perceived competency in DL and most of the participants (59.9%) reported high perceived DL competencies, while 40.1% participants presented low perceived DL competencies. This study indicates that most of the participants have a high perceived level of their DL skills. Many authors, as discussed in chapter 2, support these findings (Omosho et al., 2015; ECDL Foundation, 2016; Al-Shboul et al., 2017; Jan, 2018). The results of this study are based on perceptions and not the actual DL competencies. The ECDL Foundation (2016) cautions that there is a tendency for participants to overestimate their competencies when doing a self-assessment. Furthermore, they report that gaps exist between the perceived DL competencies and actual level of DL competencies. Tang and Chaw (2016) conclude that students need to be digitally literate to be successful in a blended learning environment and recommend that students with low DL skills need support to ensure that they have the necessary DL skills to cope with and use the technology. Morgan (2018) supports and recommends that students at higher education institutions needs support and guidance on how to use ICT for educational purposes.

5.3.3 Research objective 1: To determine students' attitudes towards using DT for educational purposes

Most of the participants indicated that to a large extent they are quite confident in uploading (73.2%) and typing assignments (71.4%), searching for information on the Internet (71.3%), using the computer for study purposes (69%) and working on a computer (65.8%). Only 34.8% of the participants indicated that they enjoy using

the discussion forums and other online forums to a large extent, while 28.7% of the participants enjoy reading their study material on the computer, 25.4% of the participants feel that they need training in DL and only 27.6% of the participants feel confident using the online library (see Table 4.6).

The study found that overall, the students have a positive attitude towards using DT for educational purposes. Similar findings were highlighted in chapter 2. Authors, Jelfs and Richardson (2013) and Morgan (2018), put forward that, students had a relatively positive attitude towards the usage of ICT.

It is concerning to note however, that the study further found that students are not comfortable with using discussion and online forums, online reading, using the online library and that further DL training is required. These findings are supported by Shopova (2014), who reported that the majority of students did not have the skills to use the electronic library. Library resources play a very important part in their studies. A study conducted by Alfonzo and Batson (2014) confirmed that the students' comfort level in terms of usage of library databases and library catalogues increased after students had attended training. Training programmes should be offered on how to use the online systems, to improve their DL skills including to create awareness on the benefits of using the library systems (Shopova, 2014; Ukwoma et al., 2016).

5.3.4 Research objective 2: To investigate the extent to which students use the Unisa LMS

Most of the participants (99.7%) indicated that they are registered on myUnisa. It can be noted that the activities mostly performed on myUnisa to a large extent are uploading assignments (64.2%), monitoring examination results (64.5%), downloading study material (61.8%), monitoring assignment results (62.9%), downloading examination papers (60.5%), and to some extent using discussion

forums (38.4%). These findings are in support of a study conducted by Tang and Chaw (2016), where the three top features of the LMS that the students liked were the online resources, online course announcements and online submission of assignments. Similar to the results of Tang and Chaw's (2016) study, the current study found that only 20.9% of the students liked online discussion.

This study further showed that the activities that are less used by the participants to a large extent are editing registration (22.8%), eTutor support (19.6%) and changing personal details (13.6%) (see Table 4.8). eTutoring is an additional teaching and learning online support service that Unisa offers to students via myUnisa (Unisa, 2019i). Studies conducted by Joubert and Snyman (2017) support the notion that students are not participating in eTutoring systems and recommend that students should be made aware of eTutors and roles of the eTutors. To encourage full usage of eTutoring support services, students should be made aware of the benefits of using eTutoring and of how to gain access to the eTutoring support services.

The results of this study are supported by Al-Shboul et al. (2017), who confirm that students are not using all of the functions of myUnisa. The LMS can be used for both academic and administrative purposes.

5.3.5 Research objective 3: To determine whether students attend regional DL workshops in the EC

The proportion of the participants who attended the regional DL workshops was 8.7% for myUnisa and myLife, 6.1% for the Signature Module workshop, 4.0% for basic computer skills, 2.9% for MS Word, 2.5% for both MS PowerPoint and MS Excel (see Figure 4.12). It is noteworthy that the attendance at regional DL workshops overall was very low.

The reasons for participants not attending training could be attributed to the fact that the majority of the participants (79.9%) had prior computer training or experience as shown in Figure 4.11, and the perception of the majority of the participants (59.9%) that they have a high DL competency, as shown in Table 4.5. Additional possible reasons for not attending the DL workshops could be that students are not aware of the workshops offered or the times of the workshops offered are inconvenient to the students.

The participants have indicated the need for training, as indicated in Table 4.6. The regional offices should consider using a variety of social media platforms to market the training offered. The regional offices should also consider the times of the workshops offered, as the majority of the participants (70.3%) have indicated that they have some form of employment as shown in Figure 4.4.

A study conducted by James and Seary (2019) also reports that students were not attending face to face classes due to the inconvenient class times as well as for other reasons such as family and personal reasons, medical and financial reasons and employment related matters. The study further suggests that the students should be informed on the benefits of the training so that they are able to see the value of the training. These findings are supported by Pokpas (2014) who suggests that awareness campaigns should be created to inform students timeously of the training initiatives, the benefits of attendance, and the relevance to their environment.

5.3.6 Inferential statistics

Inferential statistics were performed to determine whether there is any statistically significant association(s) between the socio-demographic and academic variables and perceived DL competencies. Additionally, inferential statistics were performed to determine whether there is a statistical relationship between the dependent and independent variables. In order to meet objective 4, cross-tabulation tests using the

Pearson's chi-squared tests were performed to determine the statistical association(s) between the socio-demographic and academic characteristics of the participants and their perceived DL competencies. In order to meet objective 5, Kendall's tau correlation coefficient was computed to determine the statistical relationship between perceived DL competencies and students' attitudes towards DT for educational purposes, students' usage of the LMS and students' attendance at regional DL workshops.

Research objective 4: To examine whether there are any statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies

5.3.6.1 Statistically significant association between age and perceived DL competencies

A statistically significant association between the age of the participants and their perceived DL competencies was found. The number of participants with low perceived DL competencies increases as the age category increases, whereas the number of participants with high perceived DL competencies decreases as the age category increases. Younger students tend to be more comfortable using DT for social purposes and gaming but might not have the necessary skills to use the ICT for educational purposes and the working world (ECDL Foundation, 2016). On the other hand, the adult learner might not know how to use ICT, however, they are eager to learn new skills to become independent users of ICT and they would prefer to have collaborative structured learning in the use of ICT (Schreurs, Quan-Haase & Martin, 2017; Tsai, Shillair & Cotten, 2017; Sharp, 2018).

This study used self-assessment to test the perceived DL which does not necessarily reflect the actual DL competencies of students.

5.3.6.2 Association between prior computer training or computer experience and perceived DL competencies

A statistically significant association between the participant's prior computer training or computer experience and their perceived DL competencies was found. Most of the students who had prior computer training or computer experience (59.5%) had high perceived DL competencies and the majority of the students with no prior computer training or computer experience (70.8%) had low perceived DL competencies (see Table 4.12). It was further noted the 40.5% of the students who had prior computer training or computer experience had low DL competencies. This study is based on perceived DL competencies and not on actual DL competencies and therefore it is recommended that actual DL competency assessments be performed to determine the true DL competency of students.

Studies conducted by the ECDL Foundation (2016) and Gottipati (2017) confirm that there are usually gaps between perceived DL competencies and actual DL competencies, and training on how to use ICT for educational purposes is therefore recommended. Furthermore, Morgan (2018) reports that students felt they did not have sufficient basic software and university systems knowledge when they had entered university and that they needed guidance on how to use ICT for educational purposes. These findings correlate with findings from various authors, as discussed in Chapter 2, who state that many students know how to use DT for social and leisure purposes yet do not necessarily have the required ICT skills for educational purposes (Prior, 2016; Tang & Chaw, 2016; O'Connell & Dymont, 2016; ECDL Foundation, 2016; Morgan, 2018), which reiterates the need to provide training to all students entering HE institutions to ensure that students know how to use ICT for educational purposes to enhance their learning experience.

Research objective 5: To examine whether there is a statistically significant relationship between students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies

5.3.6.3 Relationship between attitudes towards DT for educational purposes and perceived DL competencies

The null hypothesis, there is no statistically significant relationship between attitudes towards DT for educational purposes and perceived DL competencies, was rejected. Attitude towards DT for educational purposes exhibited a moderate positive correlation with perceived DL competencies (see Table 4.15). This implies that the more positive the attitude of students towards DT, the more acceptance and usage of DT there will be, which in turn will lead to a higher perceived DL competency.

The positive correlation between students' attitude towards DT for educational purposes and perceived DL competency confirms similar findings from previous studies (Kitchakarn, 2015; Alothman et al., 2017; Jan, 2018). Access to DT, computer training, usage of tablets or smartphone, proficiency of English language and encouragement to use computers are some antecedent factors to positive attitudes towards DT (Alothman et al., 2017; Jan, 2018). The regional offices should ensure that students have access to DT and should keep students abreast of the latest DT by means of awareness and training programmes. Literature reviewed in chapter 2, confirms that attitudes towards DT play a vital role in acceptance and success in the usage of DT, and therefore interventions will contribute to students having positive attitudes towards DT which will ultimately influence their DL competency (Kitchakarn, 2015; Alothman et al., 2017; He & Zhu, 2017).

5.3.6.4 Relationship between the usage of the LMS and perceived DL competencies

The null hypothesis, there is no statistically significant relationship between the usage of the LMS and perceived DL competencies, was rejected. The usage of the LMS exhibited a weak positive correlation with perceived DL competencies (see Table 4.15). This means that the more the students use the LMS the higher their perceived DL competencies are.

Studies conducted by Mabila et al. (2014) found similar results, where a positive relationship was found between the efficiency and effectiveness in using the LMS and the first-year student's e-skills level. Similarly, Malale et al. (2018) report that frequent use of the LMS is dependent on the level of DL competencies.

5.3.6.5 Relationship between attendance at regional DL workshops and perceived DL competencies

The null hypothesis, there is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies, was rejected. The attendance at regional DL workshops exhibited a weak positive correlation with perceived DL competencies (see Table 4.15). This implies that students' attendance at regional DL workshops positively influenced their perceived DL competencies.

Alfonzo and Batson (2014) note that students' DL competencies improve after attending training workshops, and report a vast improvement in student's usage of Zotero, a citation management software package, to manage digital information after attending training sessions. Prior to the training, only 33% of the students were using Zotero. However, after the training, the follow-up assessment indicated that 93% of the students indicated the usage of Zotero. Similarly, Weber et al. (2018) report that there was a significant improvement in the students' digital information

literacy after attending training on how to use scholarly databases and how to cite from scientific journal articles as opposed to using Google and other unreliable Internet sources.

5.4 RESEARCH CONCLUSIONS

The aim of this study was to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA in order to recommend appropriate and necessary training programmes.

To achieve the aim of this study, the following research question and sub-questions were formulated:

Research question:

What are the perceived digital literacy competencies of Unisa's EC students?

Research question: What are the perceived DL competencies of Unisa's EC students?

The study concluded that the majority of the Unisa students in the EC have high perceived DL competencies (see Table 4.5). As mentioned previously, this study is based on self-assessment and reflects on perceived DL competencies.

Research sub-question 1: What are students' attitudes towards using DT for educational purposes?

This study found that the majority of the students had positive attitudes towards using DT for educational purposes. The study however highlighted that students were not comfortable in the following activities: using discussion and other online forums,

reading study material online, usage of the online library and that they require more DL training (see Table 4.6).

Research sub-question 2: To what extent do students use the LMS?

The results showed that the majority of the students were registered for and are using myUnisa, the Unisa's LMS. The study revealed that myUnisa is used mainly for academic purposes and not for administrative purposes (see Table 4.8). Functions of myUnisa that were less frequently used were discussion forums, editing of registration, eTutor support and changing of personal information.

Research sub-question 3: Do students attend DL workshops in the EC region?

The study revealed that the attendance at all the DL workshops offered by the regional offices were very low (see Figure 4.12). The study further rejected the null hypothesis, there is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies. This implies that students' attendance at regional DL workshops positively influences their perceived DL competencies.

Research sub-question 4: Is there a statistically significant association(s) between the socio-demographic and academic characteristics, and the students' perceived DL competencies?

The study found that there was a statistically significant association between the age of the students and their perceived DL competencies, and a statistically significant association between the student's prior computer training or computer experience and their perceived DL competencies.

Research sub-question 5: Is there a statistically significant relationship between students' attitudes towards DT for educational purposes, usage of the LMS, attendance at regional DL workshops, and perceived DL competencies?

The study rejected all three null hypotheses:

- H1₀*: There is no statistically significant relationship between attitude towards DT for educational purposes and perceived DL competencies.
- H2₀*: There is no statistically significant relationship between usage of the LMS and perceived DL competencies.
- H3₀*: There is no statistically significant relationship between attendance at regional DL workshops and perceived DL competencies.

The study found that the independent variables: attitude towards DT for educational purposes, usage of the LMS and attendance at regional DL workshops had a statistically significant relationship with perceived DL competencies.

All research questions were successfully answered in this research study. Based on the outcomes of this study, recommendations for practice, policy and further research follows below.

5.5 RECOMMENDATIONS

Based on the findings, the following suggestions for practice, policy and further research are recommended.

5.5.1 Practice

The following recommendations would assist the EC Unisa Regional Management to support the students to improve their DL competency.

5.5.1.1 *Marketing strategy*

- It is recommended that a marketing strategy per regional office be developed that will create constant awareness among students of all office events and workshops and to encourage student attendance.
- The strategy should have an ongoing awareness campaign so that students can constantly be made aware and be reminded of the events of the office.
- The marketing strategy should additionally promote the importance and benefits of attending the various workshops offered.
- It is recommended that a variety of modes be used for the awareness campaign: myUnisa, myLife, notice boards and social media platforms should be used: SMS, WhatsApp, Facebook, Twitter.
- A further recommendation is to develop an events calendar comprising all student events per semester. The events calendar should be distributed to all students upon registration so that students are well informed in advance of the various workshop dates and times.

5.5.1.2 *DL Workshops*

- It is recommended that the DL workshops be marketed continuously in order to create awareness of the workshops and the benefits of attendance, and also to encourage attendance.
- The workshops should be conducted during working hours and after hours to accommodate the employed students.
- Mechanisms should be developed to assess and determine the actual DL competencies of the students so that the DL competency gaps can be

identified. Thereafter, workshops should be conducted to meet the identified needs of the students.

- The DL workshops should be offered continuously during the semester to support students on an on-going basis and to provide them with an opportunity to master the skills.
- Students should be constantly encouraged and motivated to use DT for educational purposes through constant training and through awareness campaigns on the benefits of using DT.
- A variety of workshops, which include all the components of DL, should be offered.
- Students should be encouraged to use online discussion forums and cloud applications.
- Special emphasis should be focused on training to prepare students for the academic environment as the student profile indicates that the majority of the students are under 29 years of age and are in the first year of their studies.
- A further recommendation is that academic literacy programmes should be considered for students who do not have English as their home language.
- Online DL workshops should be considered for students who are unable to travel to the regional offices. OERs or MOOCs could be created, or existing online courses could be used.
- The age of students should be taken into consideration when marketing and conducting regional DL workshops as the training needs could differ between younger and older students. The facilitator of the DL workshops should be aware of the different needs of the students. Older students might prefer a slower pace of DL training with extra support.

Based on the findings of this study, the following training programme, which comprises various DL workshops in line with the eight DL competency areas, is

recommended. The suggested DL workshops in this programme have been compiled by the researcher based on the literature reviewed and on the findings of this study. The suggested name for the training programme is “ToGeThere we can do it”. The ToGeThere can be read in two ways, either as “Together” or as “To get there”. The region could further investigate the possibilities of other DL workshop programmes before deciding on which DL workshop programme it wishes to offer.

By offering a variety of DL workshops, the institution would be assisting students to become digitally literate and to be able to cope in their academic environment while preparing them for the working world. The aim of the DL workshop programme is to support the students to obtain the skills and knowledge needed to become digital citizens in the 21st century and to prepare them for 4IR.

Based on the eight components of the theoretical framework (Pokpas, 2014) (see Appendix A), the eight components of DC areas are graphically displayed in Figure 5.1.

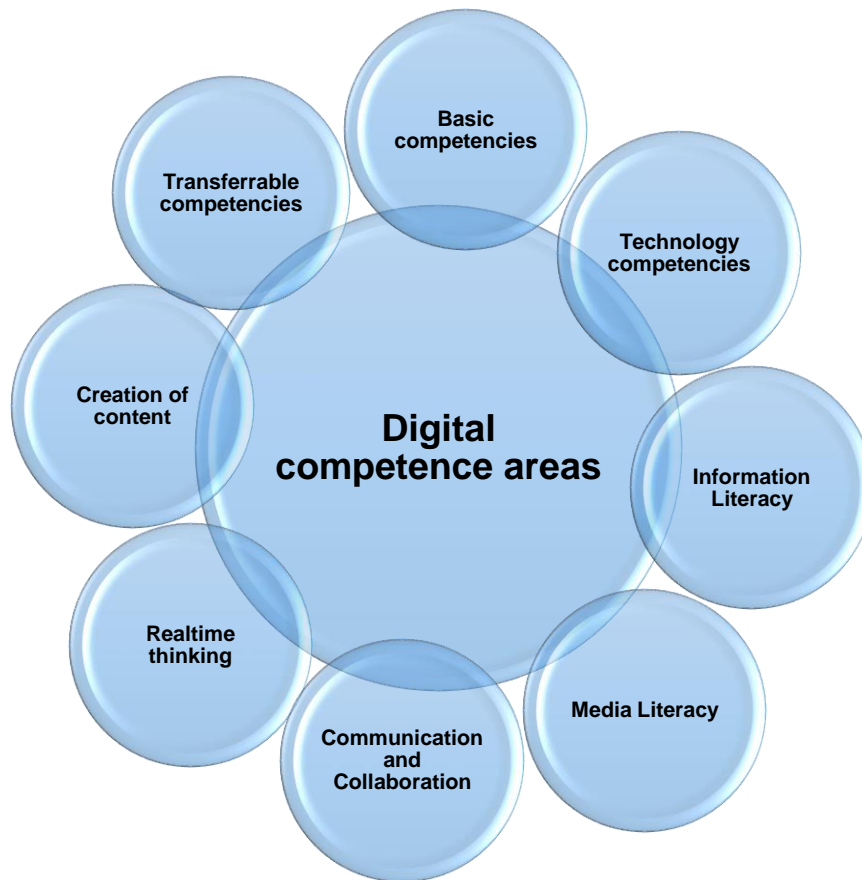


Figure 5.1: Digital competence areas (Source: Adapted from Pokpas, 2014:150)

The recommended DL workshop programme “ToGeThere we can do it” for the EC students of Unisa, based on digital competency areas proposed by Pokpas (2014) is represented in Table 5.1.

Table 5.1: Recommended DL workshop programme “ToGeThere we can do it” for the EC students of Unisa

Eight components of the DL framework	Recommended DL workshops
Basic competencies	<ul style="list-style-type: none"> • Academic Literacy and Quantitative Literacy • Basic computer skills • Typing skills • How to type an assignment/ portfolio • Understanding Tutorial Letter 101
Technological competencies	<ul style="list-style-type: none"> • Introduction to computers • Cloud computing • Online security • Awareness on preparation for 4IR: <ul style="list-style-type: none"> ○ Artificial Intelligence ○ Virtual Reality ○ Internet of Things ○ Big Data
Information literacy	<ul style="list-style-type: none"> • Online library training

	<ul style="list-style-type: none"> • How to use the Internet for information management: store, retrieve, locate, select, organise, integrate, analyse, evaluate and apply information • Referencing techniques • What is plagiarism and how to avoid it
Media literacy	<ul style="list-style-type: none"> • Online discussion forums • eTutor support • Usage of social media for education purposes
Communication and collaboration	<ul style="list-style-type: none"> • myLife training • myUnisa training – academic functions • Online social behavior – ethics and security
Real-time thinking	<ul style="list-style-type: none"> • myUnisa - admin functions • Online modules – multi-tasking
Creation of content	<ul style="list-style-type: none"> • MS Office programs: MS Word, MS Excel, MS PowerPoint (Basic, intermediate and advanced level) to cater for students from first-year to postgraduate
Transferable	<ul style="list-style-type: none"> • Internet usage training on how to obtain and evaluate information for academic purposes

(Source: Author)

Chetty (2018) recommends that DL workshops should not only concentrate on technical operations but should include awareness of cognitive and ethical concerns. DL training should assist in building the students' ability to apply their skills cognitively to evaluate, to critically reflect and to produce new information which will assist them in their academic work and prepare them for the working world (O'Connell & Dymont, 2016; Chetty, 2018). The suggested DL workshops as listed in Table 5.1 aim to provide students with an overall spectrum of all the areas of DL competency. Students who attend these workshops will acquire the relevant DL competencies to cope with their academic work and will have the basic skills to enter the workplace. The awareness of 4IR terminology is included in the training programme as it is important for the students to be made aware of the new DT that is entering the market.

Various authors have suggested that DL training is required as many students know how to use DT for social and leisure purposes, while they might not have the required skills on how to use it for educational purposes (Prior, 2016; Tang & Chaw, 2016; O'Connell & Dymont, 2016; ECDL Foundation, 2016; Morgan, 2018). Omotosho et al. (2015) further add that institutions should offer compulsory ICT training on the various ICT usages in the teaching and learning process, so that the students are skilled in the appropriate usage of ICT for academic purposes.

5.5.2 Policy

- The management of Unisa should consider reviewing the student admission policy to include a compulsory online or face to face DL competency assessment for all students entering the institution, as students enter the university with different levels of DL competencies and not all students have the required DL capabilities (Morgan, 2018). In this way a true level of DL competency can be established as suggested by the ECDL Foundation (2016). Based on the results of such an assessment, any shortfall or lack of skills can be identified, and

compulsory DL training can then be undertaken with students to fill the gaps (Malale et al., 2018). The recommendations to perform DL competency assessments and to offer training are supported by many authors (Mabila et al., 2014; ECDL Foundation, 2016; Al-Shboul et al., 2017; Malale et al., 2018; Morgan, 2018).

- The recommended DL training could be offered face to face or online as not all students are able to attend workshops offered at the regional offices.

5.5.3 Further research

The results of this study are based on the perceived DL competencies of the students, which might not be a true reflection of the actual DL competency of the students (ECDL Foundation, 2016). It is recommended that future studies should assess the actual DL competency of students as such studies will produce the true DL competency of students.

The study could be replicated in the other regions to obtain the regional and overall perceived DL competencies of all Unisa students. These results could assist other regions to craft DL workshops that are unique to the needs of students in each region. The results of the overall perceived DL competencies of all Unisa students would inform Unisa management on the status of the DL competency of the students. It could assist management in decision making on what strategies would need to be followed when introducing more eLearning programmes into the Unisa system.

5.6 CONTRIBUTION OF THE STUDY

This study is the first study of this nature that has been conducted at a Unisa regional office level. The findings of this study can be used as a baseline for future similar studies and comparisons could be made on the impact of the implemented recommendations.

This study is intended to create an awareness among regional office staff members on the important part that DL competency plays in the success of students in an ODL environment. Through this study, regional office staff members are encouraged to be innovative to promote and provide DL workshops on a continuous basis.

This study further emphasises the importance for all students of being digitally literate, not only for academic success but also to be able to effectively and efficiently operate in the digital society and for the change in DT to be prepared for the 4IR.

5.7 LIMITATIONS AND DELIMITATIONS OF THIS STUDY

The following limitations were identified which may have affected the outcomes of this study:

- An online survey was used to collect data from the students. The survey link was sent to all EC students' myLife Unisa email account. This study was therefore limited to students who use DT and students who accessed their emails within the duration period of the study. This implies that the study does not represent the entire population but only represents students who use DT and students who have access to their emails. For future research of such a nature, the researcher should ensure that students who do not use DT are included in the study.
- The regional student population is reflected at 16 983 as per the statistics received from Unisa's Department of Institutional Research and Business

(Unisa, 2019b); however the survey link sent by the DT department was sent to 18 033 students (see Appendix H). The two known reasons for this discrepancy in the student population are firstly, the statistics received from the Department of Institutional Research and Business only reflect students who are registered for formal qualifications. Secondly, the student population fluctuates as students cancel their registrations or students could be added onto the system for administrative reasons. The discrepancy value of 1 056 of the student population did not affect this study as all students who were registered during the period of the study received the questionnaire. The only effect the discrepancy had was when the demographic results of this study were generalised to the EC population (in Chapter 4).

- The response rate of the survey of 2% was very low which made the sample size small. Although the sample size was acceptable, for future studies, attempts should be made to obtain a higher response rate.

The following delimitations were identified which may have affected the outcomes of this study:

- This study was limited to the students registered in the EC region only as the purpose of this study was to identify the perceived DL competencies of the EC Unisa students so that DL workshops can be designed and conducted to meet the needs of the students in the EC.
- The questionnaire was based on self-assessment responses. A self-assessment survey is not a true reflection on actual performance as the participants tend to overestimate their abilities, being willing to perform better or trying to impress (ECDL Foundation, 2016). Future studies should test the actual DL competencies of the students and not their perceived DL competencies.

- The questionnaire was designed by the researcher to meet the aim and objectives of the study. To ensure reliability and validity of the study, future studies should use pre-designed questionnaires that have already been tested and validated.

5.8 CONCLUSION

This chapter presented the summary and interpretations of the research findings, the research conclusion, recommendations for practice, policy and further research based on the results of the study and on literature review. The chapter concluded with the contribution of this study and the limitations and delimitations of this study.

All the research questions of this study were answered as discussed in 5.4. The research aim was to investigate and describe the perceived DL competencies of the Unisa ODL students in the EC province in SA in order to recommend appropriate and necessary training programmes. The study concluded that the perceived DL competencies were moderately high (59.9%); however there were activities where the students lacked perceived DL competencies. Recommendations as discussed in 5.5 were made to address the situation.

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APPENDIX A
CONCEPTUAL FRAMEWORK FOR DIGITAL COMPETENCY

Digital competence			
Competence component	Knowledge	Skills	Attitudes
Basic	<ul style="list-style-type: none"> • Understanding of basic language, grammar and mathematical concepts 	<ul style="list-style-type: none"> • Reading, writing and performing basic numerical functions 	<ul style="list-style-type: none"> • Motivated to learn and use basic skills in ICT environments
Technological	<ul style="list-style-type: none"> • Awareness of ICT and the context and limitations of use • Awareness of potential benefits of using technology • Awareness of security risks involved in using technology 	<ul style="list-style-type: none"> • Operating hardware, software, networks and other ICT devices • Navigating through the Internet to find specific information • Applying security measures in digital environments to minimise risk 	<ul style="list-style-type: none"> • Positive attitude towards using technology and motivated to receive the potential benefits • Safe and responsible attitude towards ICT use
Information	<ul style="list-style-type: none"> • Understanding of the value of information (as a means of acquiring knowledge) and where to retrieve it 	<ul style="list-style-type: none"> • Locating, selecting, organising, integrating, analysing, evaluating and applying information 	<ul style="list-style-type: none"> • Critical and reflective attitude towards the wealth of available information
Media	<ul style="list-style-type: none"> • Awareness of traditional and 'new' media, its influence on 		<ul style="list-style-type: none"> • Critical and creative attitude towards consumed media

	perceptions and the different media platforms which exist	<ul style="list-style-type: none"> Managing different media formats (i.e. video, audio, text, graphic) 	
<i>Communication and collaboration</i>	<ul style="list-style-type: none"> Understanding of society's 'appropriate' or accepted online and offline social conduct Understanding of differences in social and formal/professional forms of online communication 	<ul style="list-style-type: none"> Applying interpersonal skills in appropriately communicating with others, on and offline Sharing, expressing and presenting information online Working in collaboration with others 	<ul style="list-style-type: none"> Positive attitude towards sharing of information and knowledge, and collaborating with others
<i>Real-time thinking</i>	<ul style="list-style-type: none"> Understanding of the nature of more interactive digital environments which operate in 'real' time 	<ul style="list-style-type: none"> Immediately processing and responding to multiple incoming stimuli 	<ul style="list-style-type: none"> An open mind-set to participate in increasingly modern and interactive digital environments
<i>Creation of content</i>	<ul style="list-style-type: none"> Awareness of the existence of online user-generated content 	<ul style="list-style-type: none"> Organising, integrating, editing, designing, inventing, applying and presenting digital content 	<ul style="list-style-type: none"> Sense of confidence to produce and share content online
<i>Transferable</i>	<ul style="list-style-type: none"> Understanding of personal goals and how technology can assist in attaining them 	<ul style="list-style-type: none"> Applying more thoughtful critical, creative and strategic thinking in the use of technology Applying sense-making and problem-solving skills in the use of ICT 	<ul style="list-style-type: none"> A critical and creative attitude in using technology Motivated to continuously learn and improve personally and professionally throughout life

(Source: Pokpas, 2014:188-189)

**APPENDIX B
ONLINE QUESTIONNAIRE**

RESEARCH PROJECT: AN INVESTIGATION INTO DIGITAL LITERACY COMPETENCIES OF OPEN DISTANCE LEARNING STUDENTS IN THE EASTERN CAPE PROVINCE IN SOUTH AFRICA

Instructions:

Please answer all the questions as honestly as possible. The information collected for this study will be collated and analysed in order to form an accurate picture of this research project: “An investigation into digital literacy competencies of Open Distance Learning students in the Eastern Cape province in South Africa”. It will assist the researcher to make findings and propose recommendations to improve the Digital Literacy support services offered to students in the Regional Offices. You do not need to identify yourself and, similarly, the researcher will uphold anonymity in that there will be no possibility of any respondent being identified or linked in any way to the research findings in the final research report. Where required, please indicate your answer with a tick (✓) in the appropriate box or type a response in the space provided. For the open-ended questions, please type your responses clearly in the space provided.

SECTION A: DEMOGRAPHICS – please tick the appropriate block

The following questions are **for statistical purposes only**.

Q1. Gender:

Male	1	
Female	2	

Q2. Age category:

18 - 24 years	1	
25 – 29 years	2	
30 – 34 years	3	
35 – 39 years	4	

40 – 44 years	5	
45 – 49 years	6	
50+ years	7	

Q3. Home language:

Afrikaans	1	
English	2	
Ndebele	3	
Northern Sotho	4	
Sotho	5	
Swazi	6	
Tsonga	7	
Tswana	8	
Venda	9	
Xhosa	10	
Zulu	11	
Other, please specify	12	

Q4. What is your employment status?

Employed full-time (permanent)	1	
Employed part-time	2	
Self-employed	3	
Unemployed	4	
Other, please specify	5	

Q5. Which level of qualification are you currently registered for?

Higher Certificate	1	
Advanced Certificate	2	
Diploma	3	
National Diploma	4	
Postgraduate Certificate	5	
Advanced Diploma	6	
Degree	7	
BTech	8	
Honours Degree	9	
Postgraduate Diploma	10	
MTech	11	
Master's	12	
Doctoral	13	
Non-degree purposes (NDP)	14	
Short learning programme (SLP)	15	

Q6. Which level are you currently studying at?

First year	1	
Second year	2	
Third year	3	
Fourth year	4	
For Master's and Doctoral students: Registered for Proposal	5	
For Master's and Doctoral students: Registered for dissertation/thesis	6	

Q7. Under which college are you registered?

College of Accounting Science	1	
College of Agriculture and Environmental Sciences	2	
College of Economics and Management Sciences	3	
College of Education	4	
College of Human Science	5	
College of Law	6	
College of Science, Engineering & Technology	7	
College of Graduate Studies	8	

Q8. Which regional office is closest to you?

East London Office	1	
Port Elizabeth Office	2	
Mthatha Office	3	

Q9. Which of the following best describes the area you live in?

Urban	1	
Rural	2	

SECTION B: DIGITAL LITERACY COMPETENCIES – please tick the appropriate block

Q10. Did you have any computer training or computer experience prior to registering at Unisa?

Yes	1	
No	2	

Q11. How would you rate yourself for the following skills in digital competency?
 'Very Poor = 1', 'Poor = 2', 'Average = 3', 'Good = 4' or 'Excellent = 5'

Item	Skills in digital competency	Very poor	Poor	Average	Good	Excellent
A	My typing skills are:	1	2	3	4	5
B	My computer skills (ability to use computers) are:	1	2	3	4	5
C	My digital literacy skills (ability to use information and communication technologies to evaluate information) are:	1	2	3	4	5
D	My ability to protect my information using technology is:	1	2	3	4	5
E	My Internet skills (ability to use the Internet) are:	1	2	3	4	5
F	My ability to find relevant information on the Internet is:	1	2	3	4	5

G	My ability to use cloud computing (store and manage information saved on a remote server) is:	1	2	3	4	5
H	My usage of media format skills (video, audio, text and graphics) is:	1	2	3	4	5
I	My online communication skills (emails, discussion forums, social media) are:	1	2	3	4	5
J	My ability to multitask using technology is:	1	2	3	4	5
K	My ability to create, edit, organise, integrate and present digital content is:	1	2	3	4	5
L	My ability to solve problems using the technology is:	1	2	3	4	5

The following questions (Q12 to Q19) are based on your knowledge of digital competency.

Please choose the best answer for each question and tick the appropriate block:

Q12. To what extent would you use the following programs to type a report for your assignment? 'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Program	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	MS Power point	1	2	3	4	5
b	MS Word	1	2	3	4	5
c	Ms Excel	1	2	3	4	5

d	MS Windows	1	2	3	4	5
e	MS Access	1	2	3	4	5

Q13. Which one of the following is not classified as a storage device?

Computer	1	
Hard drive	2	
USB	3	
CG-Rom	4	
Flash drive	5	

Q14. To what extent would you use the following terminology to obtain personal information when a fraudulent attempt is made via online communications?

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Terminology	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	Virus	1	2	3	4	5
b	Spyware	1	2	3	4	5
c	Hacking	1	2	3	4	5
d	Phishing	1	2	3	4	5
e	Spam	1	2	3	4	5

Q15. To what extent would you use the following to search for academic information? 'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Terminology	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	Google	1	2	3	4	5
b	Yahoo	1	2	3	4	5
c	Google Scholar	1	2	3	4	5
d	Facebook	1	2	3	4	5
e	MS Windows	1	2	3	4	5

Q16. To what extent would you use the following application to watch videos to assist you with your studies? 'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Application	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	Internet	1	2	3	4	5
b	Facebook	1	2	3	4	5
c	Google	1	2	3	4	5
d	You Tube	1	2	3	4	5
e	Twitter	1	2	3	4	5

Q17. When you type your entire message in capital letters on online media, it is referred to as:

You are happy	1	
You are emphasising	2	
You are shouting	3	
You are friendly	4	
You are being polite	5	

Q18. To what extent would the following application be best suited to send and receive real time (immediate) information (e.g. sharing of traffic updates)?

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Application	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	Shareware	1	2	3	4	5
b	Malware	1	2	3	4	5
c	Twitter	1	2	3	4	5
d	LinkedIn	1	2	3	4	5
e	Pinterest	1	2	3	4	5

Q19. What would be the first thing that you would do if you could not find your saved document?

Retype the document	1	
Call someone to help	2	
Use the search function	3	
Go into panic mode	4	
Look under recent documents in your program	5	

SECTION C: ATTITUDE TOWARDS TECHNOLOGY

Q20. Indicate the extent of your expertise on each of the following attitudes towards technology. 'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Statement	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	I enjoy working on the computer	1	2	3	4	5
b	I am confident using the computer for my study purposes	1	2	3	4	5
c	I am confident typing my assignments on the computer	1	2	3	4	5
d	I feel confident to upload my assignments on myUnisa	1	2	3	4	5
e	I feel my information is safe on the computer	1	2	3	4	5
f	I feel confident to search for information on the Internet	1	2	3	4	5
g	I am comfortable using the different software programs for my studies	1	2	3	4	5
h	I enjoy reading my study material on the computer	1	2	3	4	5
i	I am confident using the online library	1	2	3	4	5
j	I enjoy using the discussion forums and other online forums	1	2	3	4	5
k	I think my learning can be enhanced by using technology	1	2	3	4	5

I	I feel that I need training in digital literacy	1	2	3	4	5
m	I believe that I have sufficient digital literacy skills to cope confidently in the working world	1	2	3	4	5

SECTION D: ACCESS TO TECHNOLOGY

Q21. Do you own the following devices?

Device	Yes	No
Desktop computer	1	2
Laptop	1	2
Tablet	1	2
Printer	1	2
Smartphone	1	2

Q22. To what extent do you use the smartphone to access the Internet?

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Not to any extent at all	1	
To a small extent	2	
To some extent	3	
To a large extent	4	
To a very large extent	5	

Q23. Do you have access to the Internet at home?

Yes	1	
No	2	

Q24. Where do you access the following services? You may tick more than one option.

Item	Activities	Personal computer/	Smartphone	At work	Internet café	At telecentres	Friends or relatives	At Unisa office	Wi-Fi enabled	No access
a	Personal emails	1	2	3	4	5	6	7	8	9
b	myLife emails	1	2	3	4	5	6	7	8	9
c	MyUnisa	1	2	3	4	5	6	7	8	9
d	Typing of assignments	1	2	3	4	5	6	7	8	9
e	Online Unisa library services	1	2	3	4	5	6	7	8	9

Q25. Do you use your own device at the Unisa offices?

Yes	1	
No	2	

Q26. Do you use the Wi-Fi at the Unisa offices?

Yes	1	
No	2	

Q27. To what extent are you satisfied with the Wi-Fi connectivity at the Unisa offices?

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4', 'To a very large extent = 5' or 'Do not use WiFi at Unisa offices = 6'

Item	Wi-Fi connectivity	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent	Do not use WiFi at Unisa offices
a	It is easy to connect to the W-Fi	1	2	3	4	5	6
b	The Wi-Fi signal is strong in all venues on the campus	1	2	3	4	5	6
c	The Wi-Fi is fast enough	1	2	3	4	5	6
d	Have access to all sites relevant to my studies	1	2	3	4	5	6
e	The signal is constant	1	2	3	4	5	6

Q28. To what extent would you use the following social media platforms for educational purposes? 'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4' or 'To a very large extent = 5'

Item	Social media	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent
a	Facebook	1	2	3	4	5
b	WhatsApp	1	2	3	4	5
c	Twitter	1	2	3	4	5
d	YouTube	1	2	3	4	5
e	Instagram	1	2	3	4	5
f	Pinterest	1	2	3	4	5
g	Google	1	2	3	4	5
h	Flick	1	2	3	4	5
i	LinkedIn	1	2	3	4	5

SECTION E: USAGE OF LEARNER MANAGEMENT SYSTEM

Q29. Are you registered on myUnisa?

Yes	1	
No	2	

Q30. How often do you use myUnisa?

Daily	1	
Weekly	2	
Bi-weekly	3	
Monthly	4	
Once in 3 months	5	
Once in a semester (six months)	6	
Never	7	

Q31. To what extent do you do the following on myUnisa?

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4', 'To a very large extent = 5' or 'Do not use myUnisa at all = 6'

Item	Activity	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent	Do not use myUnisa at all
a	Change personal details	1	2	3	4	5	6
b	Edit registration	1	2	3	4	5	6
c	Download study material	1	2	3	4	5	6
d	Download examination papers	1	2	3	4	5	6
e	Upload assignments	1	2	3	4	5	6
f	Discussion forums	1	2	3	4	5	6
g	eTutor support	1	2	3	4	5	6
h	Monitor assignment results	1	2	3	4	5	6
i	Monitor examination results	1	2	3	4	5	6

Q32. How often do you use myLife?

Daily	1	
Weekly	2	
Bi-weekly	3	
Monthly	4	
Once in 3 months	5	
Once in a semester (six months)	6	
Never	7	

Q33. To what extent do you use myLife to do the following?

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4', 'To a very large extent = 5' or 'Do not use myLife at all = 6'

Item	Activity	Not to any extent at all	To a small extent	To some extent	To a large extent	To a very large extent	Do not use myLife at all
a	Receive emails only	1	2	3	4	5	6
b	Receive and send emails	1	2	3	4	5	6
c	Send emails with attachments	1	2	3	4	5	6
d	Use only for Unisa academic purposes	1	2	3	4	5	6
e	Use for personal purposes	1	2	3	4	5	6

Q34. Have you diverted your myLife emails to your personal or work email address?

Yes	1	
No	2	
Do not use myLife at all	3	

SECTION F: ATTENDANCE AT DIGITAL LITERACY WORKSHOPS

Q35. Indicate your attendance or reasons for not attending the following Digital Literacy workshops offered at the Eastern Cape Unisa offices in the past 2 years.

	Attended the workshop	Was not aware of the workshop	Time of the workshop was inconvenient	Do not require training	Did not attend the workshop
Basic Computer Skills Workshop	1	2	3	4	5
myUnisa and myLife Workshop	1	2	3	4	5
MS Word Workshop	1	2	3	4	5
MS Excel Workshop	1	2	3	4	5
MS PowerPoint Workshop	1	2	3	4	5
Signature Module Workshop	1	2	3	4	5

Q36. Kindly indicate your opinion of the workshop(s) in general.

'Not to any extent at all = 1', 'To a small extent = 2', 'To some extent = 3', 'To a large extent = 4', 'To a very large extent = 5' or 'I did not attend the workshop = 6'

Item	Statement	Not to any extent at all	To a little extent	To some extent	To a large extent	To a very large extent	I did not attend the workshop
a	I was happy with the content of the workshop	1	2	3	4	5	6
b	I was satisfied with the presenters	1	2	3	4	5	6
c	I was satisfied with the duration of the workshop	1	2	3	4	5	6
d	I am able to use the knowledge and skills learned during the workshop	1	2	3	4	5	6
e	I found the workshops too elementary (basic)	1	2	3	4	5	6
f	I found the workshop too difficult	1	2	3	4	5	6
g	I need more advanced training	1	2	3	4	5	6

Q37. My response accurately reflects my views about the institution

Agree	1	
Disagree	2	

Q38. No one in the institution interfered with the completion of my questionnaire

Agree	1	
Disagree	2	

Thank you once again for taking the time to complete this survey and for participating in this research study.

APPENDIX C
APPROVED ETHICAL CLEARANCE CERTIFICATE



UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2018/04/18

Ref: 2018/04/18/49786326/17/MC

Dear Mrs Daya

Name: Mrs R Daya

Student: 49786326

Decision: Ethics Approval from
2018/04/18 to 2021/04/18

Researcher(s): Name: Mrs R Daya
E-mail address: dayan@unisa.ac.za
Telephone: +27 83 456 5777

Supervisor(s): Name: Prof J Roberts
E-mail address: buckj@unisa.ac.za
Telephone: +27 12 337 6132

Title of research:

Digital literacy competencies of Open Distance Learning students in the Eastern Cape Province in South Africa

Qualification: M Ed in Open Distance Learning

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2018/04/18 to 2021/04/18.

*The **low risk** application was reviewed by the Ethics Review Committee on 2018/04/18 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.



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2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
7. No field work activities may continue after the expiry date **2021/04/18**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number 2018/04/18/49786326/17/MC should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,



Dr M Claassens
CHAIRPERSON: CEDU RERC
 mcdtc@netactive.co.za



Prof V McKay
EXECUTIVE DEAN
 Mckayvi@unisa.ac.za

APPENDIX D
APPROVAL FROM RESEARCH PERMISSION SUBCOMMITTEE



RESEARCH PERMISSION SUB-COMMITTEE (RPSC) OF THE SENATE
RESEARCH, INNOVATION, POSTGRADUATE DEGREES AND
COMMERCIALISATION COMMITTEE (SRIPCC)

30 August 2018

Decision: Research Permission
Approval from 1 September 2018
until 28 February 2019.

Ref #: 2018_RPSC_046
Ms. Raseela Daya
Student #: 49786326
Staff #: 90175301

Principal Investigator:
Ms. Raseela Daya
Office of the Registrar
Port Elizabeth Regional Service Centre
Unisa
dayar@unisa.ac.za, 041 392-0103/ 083 456 5777

Supervisor: Prof Jennifer Joyce Roberts, buckll@unisa.ac.za, 012 337-6132/ 083 252 2500

Digital learning competencies of Open Distance Learning students in the Eastern Cape
Province in South Africa

Your application regarding permission to conduct research involving UNISA employees, students and data in respect of the above study has been received and was considered by the Research Permission Subcommittee (RPSC) of the UNISA Senate, Research, Innovation, Postgraduate Degrees and Commercialisation Committee (SRIPCC) on 23 August 2018.

It is my pleasure to inform you that permission for the study has been granted. You may send an online survey link to all the registered students in the Eastern Cape with the gatekeeping assistance of Unisa ICT.

You are requested to submit a report of the study to the Research Permission Subcommittee (RPSC@unisa.ac.za) within 3 months of completion of the study.

The personal information made available to the researcher(s)/gatekeeper(s) will only be used for the advancement of this research project as indicated and for the purpose as described in



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this permission letter. The researcher(s)/gatekeeper(s) must take all appropriate precautionary measures to protect the personal information given to him/her/them in good faith and it must not be passed on to third parties. The dissemination of research instruments through the use of electronic mail should strictly be through blind copying, so as to protect the participants' right of privacy. The researcher hereby indemnifies UNISA from any claim or action arising from or due to the researcher's breach of his/her information protection obligations.

Note:

The reference number 2018_RPSC_048 should be clearly indicated on all forms of communication with the intended research participants and the Research Permission Subcommittee.

We would like to wish you well in your research undertaking.

Kind regards,



pp. Dr Retha Visagie – Deputy Chairperson: RPSC

Email: visagr@unisa.ac.za, Tel: (012) 429-2478

Prof Leasing Labuschagne – Chairperson: RPSC

Email: labus@unisa.ac.za, Tel: (012) 429-6368



APPENDIX E
EMAIL TO PARTICIPANTS WITH COVERING LETTER FOR SURVEY

From: no-reply@unisa.ac.za <no-reply@unisa.ac.za>

Sent: Wednesday, December 5, 2018 8:19 AM

To: DAYA R

Subject: Invitation to participate in a research study: DIGITAL LITERACY
COMPETENCIES OF OPEN DISTANCE LEARNING STUDENTS IN THE
EASTERN CAPE PROVINCE IN SOUTH AFRICA

Dear valued participant,

You are invited to participate in an online survey conducted by Ms Raseela Daya under the supervision of Prof. Jenny Roberts, an Associate Professor in the Institute for Open & Distance Learning Department, College of Graduate Studies, towards a Master's in Education Degree at the University of South Africa.

The survey you have received has been designed to study the Digital Literacy competency levels of Unisa students in the Eastern Cape. You were selected to participate in this survey as your input will contribute positively towards the success of this study and the findings thereof. By completing this survey, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.

You are, however, under no obligation to complete the survey and you can withdraw from the study prior to submitting the survey. The survey is developed to be anonymous, meaning that we will have no way of connecting the information that you provide to you personally. Consequently, you will not be able to withdraw from the study once you have clicked the send button based on the anonymous nature of the survey. If you choose to participate in this survey it will take approximately 15 – 20 minutes of your time. The survey link will be open for participation until 16 December 2018. We do not foresee that you will experience any negative consequences by completing the survey. The researcher(s) undertake to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the participating group and not from the perspective of an individual.

The records will be kept for five years for audit purposes thereafter they will be permanently destroyed. Hard copies will be shredded, and electronic versions will be permanently deleted from the hard drive of the computer. You will not be reimbursed or receive any incentives for your participation in the survey.

The research was reviewed and approved by the College of Education Ethics Review Committee. Permission to conduct research at Unisa was granted, reference number: 2018_RPSC_046.

The primary researcher, Ms Raseela Daya, can be contacted during office hours at 041 392 0102. The study leader, Prof. Jenny Roberts, can be contacted during office hours at 012 337 6132. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the College of Education Ethics Research Committee, Dr M Claassens, mcdtc@netactive.co.za. Alternatively, you can report any serious unethical behaviour at the University's Toll Free Hotline 0800 86 96 93.

You are making a decision whether or not to participate by clicking on the survey link below. You are free to withdraw from the study at any time prior to clicking the send button.

Your willingness to participate and the valuable time that you are willing to commit to complete the research questionnaire is much appreciated.

Please click on the link below to access the questionnaire.

<https://www.surveymonkey.com/r/YVNJ5PL>

With sincere gratitude for your participation.

Regards

RASEELA DAYA

APPENDIX F
REMINDER EMAIL TO PARTICIPANTS

From: no-reply@unisa.ac.za <no-reply@unisa.ac.za>

Sent: Thursday, December 20, 2018 8:44 AM

To: DAYA R

Subject: Invitation to participate in a research study: DIGITAL LITERACY COMPETENCIES OF OPEN DISTANCE LEARNING STUDENTS IN THE EASTERN CAPE PROVINCE IN SOUTH AFRICA

Dear valued participant,

You are invited to participate in an online survey conducted by Ms Raseela Daya under the supervision of Prof. Jenny Roberts, an Associate Professor in the Institute for Open & Distance Learning Department, College of Graduate Studies, towards a Master's in Education Degree at the University of South Africa.

The survey you have received has been designed to study the Digital Literacy competency levels of Unisa students in the Eastern Cape. You were selected to participate in this survey as your input will contribute positively towards the success of this study and the findings thereof. By completing this survey, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.

You are, however, under no obligation to complete the survey and you can withdraw from the study prior to submitting the survey. The survey is developed to be anonymous, meaning that we will have no way of connecting the information that you provide to you personally. Consequently, you will not be able to withdraw from the study once you have clicked the send button based on the anonymous nature of the survey. If you choose to participate in this survey it will take approximately 15 – 20 minutes of your time. The survey link will be open for participation until 15 January 2019. We do not foresee that you will experience any negative consequences by completing the survey. The researcher(s) undertake to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the participating group and not from the perspective of an individual.

The records will be kept for five years for audit purposes thereafter they will be permanently destroyed. Hard copies will be shredded, and electronic versions will be permanently deleted from the hard drive of the computer. You will not be reimbursed or receive any incentives for your participation in the survey. The

research was reviewed and approved by the College of Education Ethics Review Committee. Permission to conduct research at Unisa was granted, reference number: 2018_RPSC_046.

The primary researcher, Ms Raseela Daya, can be contacted during office hours at 041 392 0102. The study leader, Prof. Jenny Roberts, can be contacted during office hours at 012 337 6132. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the College of Education Ethics Research Committee, Dr M Claassens, mcdtc@netactive.co.za. Alternatively, you can report any serious unethical behaviour at the University's Toll Free Hotline 0800 86 96 93.

You are making a decision whether or not to participate by clicking on the survey link below. You are free to withdraw from the study at any time prior to clicking the send button.

Your willingness to participate and the valuable time that you are willing to commit to complete the research questionnaire is much appreciated.

Please click on the link below to access the questionnaire.

<https://www.surveymonkey.com/r/YVNJ5PL>

With sincere gratitude for your participation.

Regards

RASEELA DAYA

APPENDIX G

LETTER TO RESEARCH PERMISSION SUBCOMMITTEE



8 July 2018

The Research Permission Subcommittee
UNISA

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT UNISA EASTERN CAPE REGION

Research Title: Digital literacy competencies of Open Distance Learning students in the Eastern Cape Province in South Africa

Dear Chairperson of the Research Permission Subcommittee

I, Raseela Daya, an employee and student of Unisa, am currently registered for Masters in Education Degree specializing in Open Distance Learning at the University of South Africa. My supervisor is Prof Jennifer Roberts, an Associate Professor in the Institute for Open & Distance Learning Department, College of Graduate Studies. My statistician is Ms Suwisa Muchengetwa, a lecturer from the Department of Statistics of Unisa. We are requesting permission to conduct the research on all students who have registered for 2018 in the Eastern Cape Region. The title of my study is "Digital literacy competencies of Open Distance Learning students in the Eastern Cape Province in South Africa".

The aim of the study is to investigate and describe the digital literacy competencies of the Unisa Open Distance Learning students in the Eastern Cape Province in South Africa. This study seeks to investigate the following objectives:

1. To examine the relationship between student's attitudes towards technology and DL competencies
2. To investigate their accessibility to technology
3. To investigate their usage of Learner Management System (LMS)
4. To examine whether there is a relationship between attendance at current DL workshops that are offered in the region and levels of DL competencies.

The Eastern Cape Region has been selected as I am based in the Port Elizabeth office and have observed that our students are not using technology to enhance their learning experience. I have also spoken to colleagues in the East London and Mthatha offices and they are experiencing the same problems. The Eastern Cape has a diverse student population of both rural and urban backgrounds.

The study will entail an online survey, using the Survey Monkey programme. The survey link will be emailed to the students by ICT upon approval. Data collection is planned for August/September 2018, after the students have registered for semester 2 and have attended digital literacy training workshops. The benefits of this study will give the regional offices in the Eastern Cape a better understanding of the student profile in respect of their digital literacy competencies, and would thus inform the regional offices on the support programmes that can be offered that are relevant to the student's needs.

No potential risks are identified in conducting this study. There will be no reimbursement or any incentives for participation in the research.

Ethical Clearance has been received, please find attached the Ethical Clearance certificate.

Privacy, anonymity and confidentiality as per the ethics policy will be adhered to throughout the research process. The participants will be informed that their participation will be anonymous. They will be informed of the anonymity of the survey in the cover letter of the survey as well as on the first page of the questionnaire. All data and records will be backed up on a regular basis on the Unisa network with password control measures. The data will be stored on the Unisa network and only the researcher, supervisor and statistician will have access to the data. ICT department's role will be to send emails to the population of all the students who are registered in the EC. All data collected will be stored for a period of five years as per the research ethics policy. Thereafter all data will be deleted.

Students will be free to contact me via email should they require feedback on the study.

Yours sincerely



RASEELA DAYA
REGIONAL OFFICE COORDINATOR
PORT ELIZABETH OFFICE

Staff number: 90175301
Student Number: 49786326
Email Address: dayar@unisa.ac.za
Contact details 041 392 0103 / 0834565777



PROF JENNY ROBERTS
SUPERVISOR

DOCUMENTS ATTACHED:

1. RPSC Application form
2. Appendix A – Ethical Clearance
3. Appendix B – Proof of Proposal Approval
4. Appendix C – Approved Research Proposal
5. Appendix D – Proof of Registration
6. Appendix E – R Daya abridged CV
7. Appendix F – J Roberts CV
8. Appendix G – Confidentiality Agreement by Statistician

APPENDIX H
EMAIL FROM ICT DEPARTMENT CONFIRMING EMAIL SENT TO
PARTICIPANTS

From: Roberts, Jennifer
Sent: 05 December 2018 09:24
To: Daya, Raseela <Dayar@unisa.ac.za>
Subject: FW: Sending out survey for master's student

From: Myburgh, Francette
Sent: 05 December 2018 06:34 AM
To: Roberts, Jennifer <buckji@unisa.ac.za>
Subject: RE: Sending out survey for master's student

Good day Jenny

This bulk email request for survey participation has been sent out as requested.

18038 email addresses.

Regards
Francette Myburgh
UNISA ICT

From: Myburgh, Francette
Sent: Friday, 30 November 2018 12:29
To: Roberts, Jennifer <buckji@unisa.ac.za>
Subject: RE: Sending out survey for master's student

Good afternoon Jenny

With reference to the procedure to request bulk email published on eConnect, I have logged the required service requests to extract the email list and prepare the bulk email on your behalf.

SR233924
SR233920

Regards
Francette Myburgh