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A framework for South African university students' online learning: social presence, digital skills and competencies

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A framework for South African university students' online learning: social presence, digital skills and competencies

A

Research Report

By

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(1710532)

In

Partial fulfilment of the requirements for the degree

Master of Commerce in Information Systems

At the

School of Business Sciences

Faculty of Commerce, Law and Management

University of the Witwatersrand

Supervisor*:* Dr Samwel Mwapwele

ABSTRACT

Over the years, institutions of higher learning across the world have embraced the use of digital technology to facilitate learning. University students require digital skills and digital competencies to take full advantage of online learning. Additionally, one of the most important factors of students' learning experience in an online environment is the sense of belonging. Students engaging in online learning geographically separated from their instructors and peers often feel isolated.

The purpose of the study was to explore digital skills, digital competencies and social presence necessary for an effective South African university online learning. The study used the General Technology Competency and Use (GTCU) framework and the Social Presence Theory as a lens to explore the digital skills, digital competencies and social presence necessary for South African university online learning.

A case study approach was used to study in-house first-year students in a South African university learning online. A mixed method research was selected due to its fitness to answer the proposed research questions. The data was collected via an online questionnaire and the semi-structured interviews at the University of the Witwatersrand in South Africa, Johannesburg. Quantitative data was analysed using descriptive statistics and the qualitative data was analysed using thematic analysis.

Findings from the study indicated that the social-economic background does play an important role in in-house students learning online. The interaction was a challenge, participants felt isolated from their instructors which impacted their online learning experience. They did not feel a sense of belonging to their courses. The study will contribute to policies such as the South African National Development Plan (NDP) 2030 with the focus on lifelong learning, the United Nations (UN) Sustainable Development Goal 2030 goal 4. It will also contribute to the university learning and teaching policies where online learning is concerned as well as assist University improve their online learning offering. Our study links to information systems and online learning at universities.

KEYWORDS *Online learning, Digital skills, Digital Competencies, and Social Presence*

DECLARATION

I, Ntombizethu Lubisi declare that this research report is my own, unaided work. It is being submitted for the Master of Commerce in Information Systems degree at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

Ntombizethu Lubisi

Name of candidate



Signature of candidate

On the 28 day of June 2022 signed at Johannesburg

DEDICATION

This research report is dedicated to my friends, family and my colleagues for the support they have provided me during this journey. More especially to my dad Bigboy Lubisi for constantly checking my progress and if I am copying. It is also, dedicated to all first-year university students who had to adjust to learning online during a pandemic. Lastly, to my medical doctor the late Dr Sindisiwe Van Zyl for being more than a doctor but a source of strength.

ACKNOWLEDGMENTS

- The first acknowledgement will go to my Lord and Saviour Jesus Christ for guiding me, strengthening me and for being my shield when all hope seems gloomy.
- To my supervisor, Dr Samwel Mwapwele for the support and guidance throughout this journey.
- To my dad Bigboy Lubisi, my mother Busie Lubisi, my siblings Nomcebo Lubisi and Nkululeko Lubisi and my whole family for their love and support throughout this journey.
- To my friend and colleague Dr Thabang Sefalafala his professional support and guidance.
- To my friend Gift Mkhonza for constantly assisting with editing and proofreading my work as well as being a source of strength and guidance.
- To Ndivhuwo Nemudvhiso, Portia Khoza and Xolile Nsibande for their love and support.
- To Cecile Koopman for the proofreading and editing services.
- The study participants for their time and allowing me into their personal experiences. Without them, I would not have completed my research.
- The University of Witwatersrand for funding my studies as well as permitting me to conduct my research.
- Lastly, the #Past3amSquad established by Prof Mamokgethi Phakeng the support and love as we all journey to our respective studies.

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LIST OF ABBREVIATIONS

Abbreviations	Meaning
DigComp	Digital Competency
DBE	Department of Basic Education
GenZ	Generation Z
GTCU	General Technology Competency and Use a framework
ICT	Information and Communication Technology
ISP	Internet Service Provide
ITU	International Telecommunication Union
LMS	Learning Management Systems
MOOCs	Massive Open Online Courses
NDP	National Development Plan
ODL	Open Distance Learning
SDG	Sustainable Development Goals
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization
WWW	World Wide Web

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CHAPTER 1

1.1 Introduction

This research report is about digital skills, digital competencies and social presence for South African university students' online learning. With technological advances that have been taking place over the years, online learning has become one advancement that has occurred to change and shape how learning and teaching take place (Jiménez-Cortés, Vico-Bosch, & Rebollo-Catalán, 2017; Kim, 2011; Webb, McQuaid, & Webster, 2021). Universities globally have over the years adopted and use online learning as one of the delivery modes (Ahmed & Parsons, 2013; Firat & Bozkurt, 2020; Händel, Stephan, Gläser-Zikuda, Kopp, Bedenlier, & Ziegler, 2020; Kim, 2011). However, with the discovery of the novel global pandemic of Covid-19 in 2020, universities had to swiftly move to online learning to mitigate the spread of the virus (UNESCO, 2020b). One of the regulations of Covid-19 being social distancing, which meant that students could not congregate with their peers face-to-face and that affected their experience of social presence. Moreover, having to rely on online classes to engage with their peers, while some may lack the necessary digital skills and digital competencies that will enable the interaction.

An article published by UNESCO stated that at least nine (9) out of 10 (ten) students worldwide experienced classroom learning interruption due to the COVID-19 pandemic (UNESCO, 2020a). School closures within the 191 countries affected 1.5 billion students from pre-primary to tertiary education (UNESCO, 2020a). Additionally, almost half of all the students worldwide experienced barriers to online learning due to school closures (UNESCO, 2020a). UNESCO conducted a survey between December 2020 to February 2021 measuring the impact the school closure had on higher education nationally and globally. The survey intended to assess the impacts of the pandemic on higher education concerning access, equality and quality of teaching and learning, university operation, national challenges, emerging issues, and strategic responses (UNESCO, 2021, p. 2). One of the findings were more than 200 million tertiary-level students around the world experienced education disruptions as a result of the global pandemic of Covid-19 (UNESCO, 2021).

The United Nations (UN) identified 17 sustainable development goals (SDGs) to transform our world's envision for 2030 (United Nations 2015). This study intended to focus on SDG goal no 4 which focuses on quality education. The main aim of goal 4 is to "*ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*"(United Nations 2015, p. 19). With the focus on goal 4.3 which state that "*by 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university*"(United Nations 2015, p. 19). This research argued that for online learning to be effective and sufficient university students ought to acquire certain digital skills and digital competencies. Acquiring of such skills will therefore enable students to interact with their learning content, instructors and their peers which has an impact on how they view and experience social presence in an online learning environment.

1.2 Digital Skills

Digital skills are defined "as a range of abilities to use digital devices, communication applications, and networks to access and manage information" (UNESCO, 2018, p. 1). To fully participate in the digital era, students are required to have some level of digital skills, such as locating content on the internet, using digital devices, communication applications, and networks to access and manage information (Hargittai, 2005; UNESCO, 2018). Acquiring these skills enables students to be both digital content users and creators. They can apply their creativity and create work they can monetise and share on online platforms such as YouTube, TikTok, Instagram, etc. Furthermore, people can use the skills to learn, work, collaborate and communicate with the digital community at large (UNESCO, 2018). Generation Z (GenZ) students, born between the years 1997 – 2012, are assumed to be tech-savvy (Adedoyin & Soykan, 2020; Prensky, 2001; Seemiller & Grace, 2016). However, a substantial number of them do not have the necessary digital skills for online learning (Adedoyin & Soykan, 2020; Bennett, Maton, & Kervin, 2008; Händel et al., 2020).

1.3 Digital Technologies

The Digital Competency (DigComp) framework has adopted digital technologies as the agreed terminology which is a 'device-agnostic' wording that allows 'future-proofing' in the rapidly changing field of technologies (ITU Academy, 2019, p. 4). The terminology remains device and application neutral rather than referring to a specific device or application. The term makes it easy to refer to all technologies, thus not necessitating naming technology, software or an application when referencing knowledge, skills and attitudes related to each competence (Ibem & Laryea, 2014; ITU Academy, 2019). The terminology incorporates not only the use of personal computers such as desktops, laptops or tablets, but it also refers to other hand-held devices such as wearable, smartphones, games consoles, medial players or any device connected to the internet (Ibem & Laryea, 2014; ITU Academy, 2019).

1.4 Digital Competencies

The European Commission (2006) has acknowledged digital competence as one of the eight key competencies for "*Lifelong Learning*". Chapter nine of the South African National Development Plan (NDP) 2030 on improving education and training and innovation universities are among the institutions expected to play a role in lifelong learning (National Planning Commission, 2012). Digital competence is said to "involve the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competencies related to cybersecurity), intellectual property related questions, problem-solving and critical thinking" (The Council of the European Union, 2018, p. 9).

Digital competence is regarded as the range of skills, knowledge and attitudes that are needed when using Information and Communication Technology (ICT) and digital technologies when one is required to carry out tasks such as problem-solving, information management, collaborating effectively with respect, efficiency and ethically (Ferrari, 2012; He, Huang, Yu, & Li, 2020) Additionally, Calvani, Cartelli, Fini and Ranieri (2008, p. 186) defined digital competence as "the

ability to explore and face new technological situations flexibly, to analyse, select and critically evaluate data and information, to exploit technological potentials to represent and solve problems and build shared and collaborative knowledge, while fostering awareness of one's own personal responsibilities and respect of reciprocal rights/obligations".

1.5 Social Presence

Social presence, conceptualised by Short, Williams and Christie (1976), explains the role that a selected medium of communication can have on how people communicate. According to Short et al. (1976, p. 65), social presence "is the degree of salience (i.e., quality or state of being there) between two communicators using a communication medium. They posited that communication media differ in their degree of social presence and that these differences play an important role in how people interact".

1.6 Problem statement

Universities learning entails three types of interactions: student-to-content, student-to-instructor and student-to-student, which results in students' perception of social presence in online learning (Aydin, 2021; Landa, Zhou, & Marongwe, 2021). However, literature does not adequately address the digital skills and competencies necessary for online learning (Landa et al., 2021; Mpungose, 2020). Social presence is experienced by students in a fully online learning environment, especially in the context of South African university learning (Landa et al., 2021). In other words, there are knowledge gaps in terms of the digital skills and competencies for South African first-year students' online learning, including their social presence experience with online learning. Therefore, there is a need for a framework that will address the digital skills, digital competencies and social presence for South African university online learning. This study thus seeks to bridge that gap.

1.7 Purpose and goal of the study

- The purpose of this study is to explore digital skills, digital competencies and social presence necessary for an effective South African university online learning.
- The goal is to determine how digital skills, digital competencies and social presence impact South African university online learning

1.8 Study objectives

The study objectives are as follows

- To explore how social-economic background influences online learning.
- To explore how social presence enables university online learning.
- To explore how digital skills and digital competencies improve university online learning.

1.9 Research questions

1.9.1 Primary research question

What digital skills, digital competencies and social presence are necessary for an effective South African university online learning?

1.9.2 Secondary research questions

- What influence does social-economic background have on online learning?
- What influence does social presence have on university online learning?
- What influence does digital skills and digital competencies have on university online learning?

1.10 Identified knowledge gaps

There are three knowledge gaps identified for the study; theoretical, practical and contextual knowledge gaps discussed below.

1.10.1 The theoretical knowledge gap

Studies conducted on students' perception, the impact of age and gender on the level of digital competencies (Llorent-Vaquero, Tallon-Rosales, & de las Heras Monastero, 2020; McGuinness & Fulton, 2019). Research also shows digital skills development alongside digital competency frameworks for teachers (Falloon, 2020; Zhao, Pinto Llorente, & Sánchez Gómez, 2021). However, a study conducted by Bozkurt, Jung, Xiao, Vladimirschi, Schuwer, Egorov, Lambert, Al-Freih, Pete and Olcott Jr (2020) indicated a conceptual and theoretical framework aimed at university online distance education does seem not to exist. The study outcome hoped to extend knowledge on digital skills, digital competency and social presence aimed at students studying online in South African universities. Moreover, expand on how goal no 4 of the National development plan 2030, SDG can be achieved (United Nations 2015). Goal no 4 seek to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations 2015). Therefore, university students acquiring digital skills and digital competencies for online learning may promote inclusive and quality education, which will promote lifelong learning opportunities.

1.10.2 The practical knowledge gap

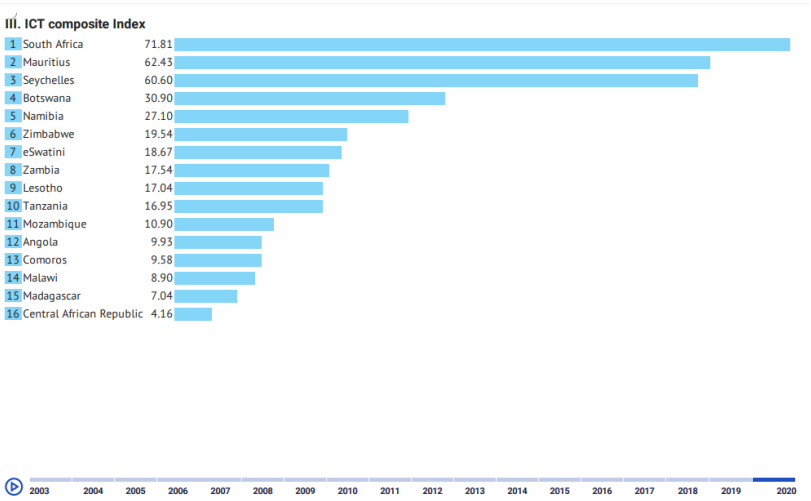
Literature indicates that institutions of higher learning were not adequately prepared for online learning. Unsupported infrastructure, lack of internet connection for both students and academics on top of inadequate digital skills and digital competencies for online learning and teaching were areas of concern (Adedoyin & Soykan, 2020; Bozkurt et al., 2020; Chaka, 2020; Khaddage, Fayad, & Moussallem, 2020). Access to infrastructure, learning interactions (student-to-content, student-instructor and student-student), the social presence that affects and influence online learning is not well addressed (Adedoyin & Soykan, 2020; Ali, Narayan, & Sharma, 2020); Bozkurt et al. (2020); (Falloon, 2020). The study intended to fill that gap.

1.10.3 Contextual knowledge gap

A study investigating the interruption of education globally due to the pandemic of Covid-19 indicated that digital skills and digital competencies were among the issues and challenges raised (Bozkurt et al., 2020). South Africa was one of the countries selected for the study. The South African landscape is unique in the challenges and issues experienced in South African university learning are unique due to the legacy of apartheid. According to the Africa Infrastructure Development Index (AIDI), South Africa is ranked as number one of the sixteen members of state in the Southern African Development Community (SADC) based on the ICT composite index as indicated in Figure 1 (African Development Bank Group, 2021). However, South Africa is ranked 9th out of the 16 members of states in the SADC in terms of data per gigabyte (GB) cost making it harder for students to access online learning (Chinembiri, 2020).

Access to information and communication technologies (ICTs) is not spread evenly within different populations and households (Lembani, Gunter, Breines, & Dalu, 2020). Access to ICTs impacts learning interactions *(student-to-content, student-instructor and student-student*), affecting and influencing online learning within the South African context that is not adequately addressed by literature. Therefore, a need to situate the study in South Africa with a focus on university students.

Figure 1 - ICT composite Index



1.11 Delimitations of the study

- The study only focuses on university online learning with the students as a unit of analysis.
- The study does not focus on instructors or administrative staff.
- The study does not also analyse digital technologies.

1.12 Summary of the chapter

Chapter one of the study focused on outlining and discussing keywords making up the research topic to provide readers with common knowledge about the research report. That was followed by the problem statement, purpose and the goal of the study, the study objectives, research questions, identified the knowledge gaps and the delimitations of the study. The next section will focus on the literature review.

The rest of the research report is structured as follows.

Chapter 2 of the study focused on the literature that was engaged to answer the research question. To further elaborate what other scholars have discussed under the area of digital skills, digital competencies and social presence.

Chapter 3 discussed the theoretical underpinnings of the study and the concepts that make up the study. Additionally, the conceptual research framework developed was discussed.

Chapter 4 discussed the research methodology that was followed to answer the research questions, the rigour of the study as well as the ethical considerations.

Chapter 5 analysed the data that was collected through the online questionnaire and the semi-structured interviews.

Chapter 6 discussed the findings of the study.
Lastly,

Chapter 7 discussed the conclusion of the study by outlining the study contributions, study limitations and future research recommendations.

2 LITERATURE REVIEW

2.1 Introduction

This chapter outlines the literature review used to answer the research questions. It provides a comprehensive summary of previous research conducted on digital skills and digital competencies among university students learning online with a focus on the South African context. This chapter further explores social presence in a fully online learning environment amid the Covid-19 pandemic. Lastly, online participation and the different learning theories.

2.2 Learning

Educational psychologists mention that "learning occurs whenever the activity of an organism brings about a relatively permanent change in its behaviour" (Stones, 2011, p. 52). Furthermore, learning is any activity that leads to a change in our behaviour (Stones, 2011). Gurley (2018) identify three forms of how learning takes place namely, face-to-face, online and blended learning. Face-to-face learning, sometimes called contact learning, provides real-time interaction with resources and others (Mpungose, 2020). Face-to-face learning is characterised by having zero (0) to twenty-nine (29%) of the course content delivered online (Gurley, 2018). The second form of learning is online learning which takes place over the internet and is characterised by having eighty percent (80%) of the course contact delivered online (Gurley, 2018; Mpungose, 2020). Lastly, blended learning, also called hybrid learning (combination of face-to-face and online teaching and learning), involves having between thirty (30%) percent and eighty (80%) percent of the course content delivered online (Gurley, 2018; Kintu, Zhu, & Kagambe, 2017).

The discovery of the global pandemic of Covid-19, which necessitated online learning, required online interaction to be investigated (Landa et al., 2021; Munoz, Wang, & Tham, 2021). Interaction has been viewed as one of the most critical aspects of a learning experience both online and traditional learning (Händel et al., 2020; Kang & Im, 2013). Interaction occurs between students and their learning content, students and instructors and students with their peers as they construct new knowledge (Händel et al., 2020; Kang & Im, 2013). Moore (1989) identify three types of online interactions namely, "student-content interaction, student-instructor

interaction, and student-student interaction". With technological changes which necessitated online interaction student-content interaction has evolved from textbook to computer-assisted content (Lin, Zheng, & Zhang, 2017). So has student-instructor interaction moved from face-to-face to technologically enhanced through mobile devices and other devices (Abbasi, Ayoob, Malik, & Memon, 2020). Lastly, student-student interaction moved from physical to virtual interaction supported by mobile devices (Tsang, So, Chong, Lam, & Chu, 2021).

2.2.1 Student-Content interaction

The first type of interaction identified is the interaction that occurs between students and the content or subject of study (Moore, 1989). Without this type of interaction, education cannot take place. Students are to engage or interact with the content, resulting in understanding (Händel et al., 2020; Moore, 1989). It is the process whereby students engage with a piece of information, which can be text, lecture or a television program. Holmberg (1991) classify it as the "internal didactic conversation" when students "talk to themselves" about that particular piece of information. The type of content students get to interact with has changed over the years from traditional print, audiotapes, videotapes to content found online such as podcasts, text such as PDF and recorded lessons (Nadolny, 2017; Webb et al., 2021; Xiao, 2017). Xiao (2017) emphasises the importance of research on student-content interaction, stating that learning material plays an important role in distance or online learning.

2.2.2 Student-Instructor interaction

The second type of interaction that occurs during a learning process is student and instructor, is the latter being a subject matter expert. The subject matter expert is responsible for creating the learning content (Moore, 1989). The role of an instructor is to ensure that they stimulate while maintaining students' interest during a lesson. They do this by motivating students to learn by enhancing and holding students' interest, including self-direction and self-motivation (Moore, 1989). Ponti (2014) further supports the notion that students still need the assistance of the instructors to make sense of the concepts they are learning even in the era of increased access to learning material. Instructors present the content, demonstrate the skills or model certain attitudes and values (Moore, 1989). After which, the content instructors then organise students

to apply what they have learned to evaluate learning progress (Moore, 1989). Lastly, the instructor provides feedback in a form of counsel, support or encouragement tailor-made to particular students' needs (Moore, 1989).

2.2.3 Student-Student interaction

The third and last form of interaction that occurs during a learning process is a student interacting with another student(s), which can be in a group setting without the presence of an instructor (Moore, 1989). Grouping students together provides a learning opportunity; students learn how to work with others, learn from each other and manage group dynamics, skills needed in business or regular employment (Phillips, Santoro, & Kuehn, 1988). Gameel (2017) and Händel et al. (2020) mentioned that interaction between a student and other students is more valuable in an online learning environment. Social media such as WhatsApp, Facebook and Twitter have been used as one of the tools to facilitate online interaction among students (Chugh & Ruhi, 2018; Moore & Kearsley, 2011; Munoz et al., 2021; Rahman, Ramakrishnan, & Ngamassi, 2020). Some of the lessons derived from inter-learner group interaction are teaching task stimulation and motivation from the peers within a group (Moore, 1989). This witnessed predominantly in younger students (Moore, 1989).

The study is based on a fully online learning approach where students interact with their instructors, their learning content as well as with other students online.

2.3 Online learning

2.3.1 The evolution of online learning

The internet dates back to 1969 as an invention of the Department of Defence (McLuhan, 1969). The changes to the use of the internet became more apparent 20 years later when Tim Berners-Lee of the European Organisation for Nuclear Research introduced what we now referred to as the World Wide Web (WWW). Berners-Lee and a colleague then introduced the Web to the rest of the world in 1991 (Fritsch, 2001). During the nineteenth century, the growth of distance education necessitated the use of television as means of facilitating correspondence courses (Fritsch, 2001; Perry & Pilati, 2011). By the late 1990s, learning evolved into using the Web, which

indicated a paradigm shift in the use of technology in learning (Fritsch, 2001; Perry & Pilati, 2011). By 2002, about 1.6 million students had enrolled for at least one online course (Allen & Seaman, 2010).

By 2009, the numbers grew exponentially to 19.9 million, which indicated that technological advances were inevitable (Allen & Seaman, 2010). Many terminologies describe online learning, often used interchangeably for online learning include eLearning, virtual learning, internet learning, m-learning and web-learning (Ally, 2004). Online learning includes any form of learning that occurs via a digital device and is delivered via the internet (Chaka, 2020; Khaddage et al., 2020 (Chaka, 2020; Khaddage et al., 2020). Online learning is defined as "the use of electronic technology and media to deliver, support, and enhance both learning and teaching and involves communication between students and teachers utilising online content" (Howlett, Vincent, Gainsborough, Fairclough, Taylor, Cohen, & Vincent, 2009, p. 372). Furthermore, online learning is seen as "the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (Ally, 2004, p. 17). Online learning has evolved over the years inspired by Web 1.0; the transfer of knowledge was one-way. The teacher was the custodian of knowledge termed as "teacher-centred" model (Demartini & Benussi, 2017; Gueye & Exposito, 2020).

Education 1.0 was limited to a privileged few (Gueye & Exposito, 2020). The evolution of online learning saw a shift from Education 1.0 to Education 2.0 (Demartini & Benussi, 2017). Education 2.0 saw communication and collaboration growing and the use of podcasts, blogs, social networking and LMSs (Gueye & Exposito, 2020). Education 3.0 saw a shift to a more student-centred approach; the role of the teacher became that of facilitator applying the flip classroom methods (Demartini & Benussi, 2017). A flip classroom is whereby students have access to learning content outside the classroom that could be uploaded to the LMS (Cheng, Hwang, & Lai, 2020). Students have an opportunity to engage with the content ahead of the classroom (Galindo-Dominguez, 2021).

Education 3.0 is characterised by the learner becoming connectors and creators of knowledge using social media, open access to information and use of Massive Open Online Courses (MOOCs)(Demartini & Benussi, 2017; Gueye & Exposito, 2020). With Education 4.0 learning becoming more interactive and automated, students became co-creators of knowledge, increasing the use of technologies, such as virtual reality, robotics and smart classrooms (Gameel, 2017; Gueye & Exposito, 2020).

The study adopted Education 3.0 based on current technology provided by the institution being studied. Wits University uses Canvas LMS referred to as *ulwazi* transitioned from Sakai. Both platforms support online interaction and student engagement through discussions and forums tools embedded in the LMS. Students interact with content uploaded by instructors as well as their tutors. Furthermore, they interact with their peers through chat and discussion forums.

2.3.2 Universities and online learning

Institutions of higher learning in South Africa showed interest in technology since the year 2000, this was seen by the increase in ICT infrastructure budget than in previous years(CHE, 2005). ICT was adopted to conduct their daily activities, which often include teaching and learning (Barber, DiGiuseppe, van Oostveen, Blayone, & Koroluk, 2016; Khaddage et al., 2020; Mkhize, Mtsweni, & Buthelezi, 2016). What makes online learning different from traditional face-to-face learning is the ability to allow online interaction between students-content, students-instructors and student-student (Adedoyin & Soykan, 2020; Bharuthram & Kies, 2013; Kang & Im, 2013; Khaddage et al., 2020; Perry & Pilati, 2011). The use of online learning also provides students with flexibility, the ability to communicate and collaborate easily with their peers as well as with the instructors (Adedoyin & Soykan, 2020; Bharuthram & Kies, 2013; Damoense, 2003; Perry & Pilati, 2011; Queiros & De Villiers, 2016). Moreover, online learning provides access to education regardless of students' and instructors' geographic location, time and place (Khaddage et al., 2020; Shen, Kuo, & Minh Ly, 2017).

The sudden increase on the use of ICT saw universities using LMSs to provide learning content, Self-Service Portals, Microsoft Office products, Online libraries and other learning digital technologies (Barber et al., 2016; Bozkurt et al., 2020; Henderson, Selwyn, & Aston, 2017).

Students can engage with their learning content digitally, for example, assignments, lecture notes, lecture recordings and grades(Henderson et al., 2017; Henderson, Selwyn, Finger, & Aston, 2015). They can also use online facilities to research information, engage with information in visual forms and look for supplementary material to support their learning (Barber et al., 2016; Henderson et al., 2017; Henderson et al., 2015)

However, research indicates that university students previously used the LMS for administrative purposes rather than teaching and learning (Bozkurt et al., 2020). Therefore, a need for student training and awareness of LMS arose as one of the skills and competencies needed to succeed in their learning (Bozkurt et al., 2020; Davies & Graff, 2005; Demartini & Benussi, 2017). Ala-Mutka, Punie and Redecker (2008) recommended that institutions of higher learning should not design a separate platform for digital skills training; to be embedded in the teaching and learning process of all subjects. Additionally, students need to be motivated to acquire digital competency to remain relevant in the digital age (Omotayo & Haliru, 2020).

2.3.3 The impact of Covid-19 in education

In January 2020, the World Health Organization (WHO) declared the outbreak of COVID-19 as a pandemic (World Health Organization, 2020a). WHO released a set of guidelines to be followed to contain the spread of the virus (World Health Organization, 2020b). Based on the guidelines provided by WHO to help contain the spread of the virus in March 2020, President Cyril Ramaphosa declared the national state of disaster and placed South Africa under lockdown (Ramaphosa, 2020). The lockdown regulations entailed restrictions on international travel, prohibition of gatherings of more than 100 people and the closure of schools and other educational institutions, including universities (Ramaphosa, 2020). The Minister of Higher Education, Science and Innovation, Mr Blade Nzimande, announced an early recess for all post-school institutions (Nzimande, 2020). During the break, institutions explored possible solutions for online learning as one of the means to deal with the pandemic while ensuring that learning continues (Nzimande, 2020).

Some universities globally, nationally and locally previously adopted online learning for some of their programs (Landa et al., 2021; Webb et al., 2021). However, the advent of the COVID-19 global pandemic accelerated the implementation of online learning for universities (Landa et al., 2021; Munoz et al., 2021; Webb et al., 2021). Universities expedited fully online learning to mitigate the spread while finishing the academic year. In response to the pandemic, universities had to extend their LMS's offering by creating additional learning activities to enhance learning and teaching (Bozkurt et al., 2020).

2.3.4 Challenges with online learning

South Africa is a developing country resulting from past injustices and discrimination caused by the Apartheid era and still faces many challenges such as political, economic, social, and technological access (Mgqwashu, Timmis, De Wet, & Madondo, 2020; Mojapelo, 2020). Although the Apartheid era was between the years 1948-1994, its legacy remains while the previously disadvantaged continue to suffer its consequences. Strand and Britz (2018, p. 364) well recapitulate the legacy of Apartheid by mentioning that.

> "Many South Africans, particularly those in rural areas, are still living under conditions of information poverty, which we define as that situation in which people, within a specific context, do not have the required skills, abilities, and/or material means to access and use information in a meaningful way to address their needs".

The digital era has created learning opportunities for individuals intending to learn regardless of their geographical location and time differences (Dimri, 2021; Nguyen, 2015; Rizvi, Rienties, & Khoja, 2019; Yaniawati, Kariadinata, Sari, Pramiarsih, & Mariani, 2020). The move to fully online learning encountered challenges such as existing socio-economic issues, institutional lack of preparedness and training for both students and lecturers (Adedoyin & Soykan, 2020; Dwivedi, Hughes, Coombs, Constantiou, Duan, Edwards, Gupta, Lal, Misra, Prashant, Raman, Rana, Sharma, & Upadhyay, 2020).

Challenges often experienced by students using digital technologies for online learning range from poor to no internet access to, lack of digital technologies such as laptops to access online learning (Ali et al., 2020; Bezuidenhout, 2018). Low literacy has been cited as one of the challenges some university students often experience (Bharuthram & Kies, 2013). The digital skills and digital competencies to use those laptops for online learning purposes (Adedoyin & Soykan, 2020; Cloete, 2017). As a result, students lacking digital skills and competencies cannot fully benefit from online learning, aimed to bridge the gap in access to higher education (Cloete, 2017).

A study conducted by Bozkurt et al. (2020) summarised the experiences of different countries on online learning in Sub-Saharan countries. The study indicated that most countries were not fully prepared for online learning (Bozkurt et al., 2020). Rizvi et al. (2019, p. 33) identified the following challenges with online learning "*individual characteristics*, such as region of origin, age, gender; *environmental concept* such as poverty level, parental education, cultural background, nature of employment; *academic characteristics*, such as level of education, previous educational outcomes, distinct approaches towards studying; and *learning environment variables*, such as learning design, students' interactions with other students or with learning resources.

A study by Frehywot, Vovides, Talib, Mikhail, Ross, Wohltjen, Bedada, Korhumel, Koumare and Scott (2013) further identified that rural areas struggle with inadequate infrastructure, not enough technical support staff, costs of maintaining platforms and the time commitment required from instructors. Other issues identified from the literature included lack of physical space conducive for learning, mental health challenges, fast and reliable internet connection and shortages of digital technologies such as laptops (Adedoyin & Soykan, 2020; Baticulon, Sy, Alberto, Baron, Mabulay, Rizada, Tiu, Clarion, & Reyes, 2021). Additionally, Dimri (2021) argued that student digital proficiency was not in question before online learning implementation. These issues have resulted in poor online class attendance and participation, as identified by (Adedoyin & Soykan, 2020).

For online learning to be effective, students must have access to learning digital technologies, internet access, an uninterrupted power supply and a conducive learning environment (Lawrence & Fakuade, 2021). However, students from rural areas continue to be excluded from learning due to their previously disadvantaged social background (Dube, 2020; Lawrence & Fakuade, 2021; Pillay, 2021). As a result, students from rural areas feel like they do not belong and may be seen as incompetent (Kizilcec, Davis, & Cohen, 2017). Due to Covid-19 regulations that required social distancing, students needed to adjust to online learning, as a result, some may feel their social presence compromised.

However, the South African government under the Department of Basic Education (DBE) has committed to including coding and robotics curriculum starting from Grade R-9(DBE, 2019). That will ensure that learners are exposed to digital skills and digital competencies at their earlier learning life. Acquiring such skills will improve their online learning and as a result be able to experience social presence in their online classes.

2.4 Social Presence

2.4.1 Conceptualisation of Social Presence

From Short et al. (1976) conceptualisation of social presence, the way people interact and communicate is determined by the quality of the medium of communication used (Lowenthal, 2009). Tu (2000) advanced the argument and conceptualised social presence by adding three dimensions of social context, online communication and interactivity. Social context is concerned with the task students engage in and the privacy they perceive as they perform those tasks (Tu & McIsaac, 2002). Online communication occurs when students interact with their instructors and other students via social media (Oyarzun, Stefaniak, Bol, & Morrison, 2018; Tu, 2002). Lastly, interactivity occurs when students interact with the content, instructors and their fellow peers (Moore & Kearsley, 2012). The three dimensions will serve as the basis of the argument for the rest of the study.

Literature provides evidence that social presence is strongly associated with the level of interaction between course participants, which includes (*student-student and student-instructor interaction*) (Oyarzun et al., 2018; Tu, 2000; Tu & McIsaac, 2002). Social media, such as Facebook, WhatsApp and Twitter, have been some of the tools that instructors have relied on to create connections and interact with students (Munoz et al., 2021; Sobaih, Hasanein, & Abu Elnasr, 2020). Students use social media to build communities and interact with fellow students (Greenhow & Galvin, 2020; Sobaih et al., 2020). Additionally, Sobaih et al. (2020) mentioned that proper use of social media has been seen to promote social presence in the new era of social learning.

2.4.2 Impact of Covid-19 on Social Presence

Covid-19 lockdown regulations required social distance, leading to the accepted contact learning being expedited to online learning, of which the preparation was inadequate (Adedoyin & Soykan, 2020; Bozkurt et al., 2020). One of the challenges experienced by both students and instructors during these unprecedented times were engagement and participation (Lowenthal, Borup, West, & Archambault, 2020). Little to no interaction (when compared to student-student interaction, student-instructor, and student-content interaction) in an online learning environment has the potential of making students feel disengaged and, as a result running a risk of dropping out (Tallent-Runnels, Thomas, Lan, Cooper, Ahern, Shaw, & Liu, 2006). Admittedly, the effective use of social media in an online learning environment has the potential of making students feel less isolated(Greenhow, Galvin, Brandon, & Askari, 2020). Social media, specifically WhatsApp, was instrumental in fostering communication among students with their peers and instructors, traditionally done face-to-face (Sobaih et al., 2020). Students relied on social media for engagement with their learning on top of supporting each other, resultant from building online communities (Sobaih et al., 2020). As a result, social media use did promote social presence (Greenhow & Galvin, 2020; Sobaih et al., 2020).

Online learning is arguably more convenient than traditional learning because it provides students with many opportunities to take simultaneous admissions (Dimri, 2021). Conversely, online learning separates students and tutors from forming social connections with instructors and peers (Moore & Kearsley, 2012). Students are geographically separated from their instructors and peers

when participating in online learning and utilise different technologies to interact and access learning content (Moore & Kearsley, 2012). Students are required to learn how to study through the use of technology and communicating for learning purposes, different from communicating socially (Moore & Kearsley, 2012).

2.4.3 Online Participation

Moore (1989) identified three types of interactions in an online learning environment namely, student-content, student-instructor and student-learner. The different interactions tend to determine the level of online participation by students learning online. Online participation is defined as "a complex process of taking part and maintaining relations with others, is supported by physical and psychological tools, is not synonymous with talking or writing, and is supported by all kinds of engaging activities" (Hrastinski, 2009, p. 81). Johnson and Johnson (2009) proposed that the effectiveness of online learning should encourage promotive interaction. Johnson and Johnson (2009) mention that promotive interaction occurs when individuals exchange information, provide efficient and effective assistance to each other, are motivated to succeed for mutual benefit, influence each other to succeed, and challenge each other. Also, Davies and Graff (2005) assert that participation occurs when students have access to information and communication they can engage in learning activities. These can include accessing learning and teaching material, collaborating and communicating with peers and instructors and completing their online learning activities(Lawrence & Fakuade, 2021).

However, Ali et al. (2020) posit that frustrations with learning digital technologies and the lack of personal connections between instructors and students pose a challenge to online learning. The study further reflected on "at-risk students" who face challenges with online learning due to lack of proper digital technologies, home environment not conducive for learning, family responsibilities and connectivity issues (Ali et al., 2020). Students often face a risk of feeling isolated with online learning. Taylor, Marrone, Tayar and Mueller (2018) suggest that lecturers build quality relationships with students engaging in an online learning environment to reduce feeling isolated. The building of quality relationship improves student-instructor interaction.

2.5 Learning Theories

There are many definitions of learning from different theorists (Ertmer & Newby, 1993). Learning is defined as "an enduring change in behaviour, or in the capacity to behave in a given fashion, which results from practice or other forms of experience" (Schunk, 2012, p. 3). Learning is characterised by a change in behaviour, endurance over time and it occurs through experience (Schunk, 2012). Learning can take place when one interacts with others (Siemens, 2005).

Three commonly known learning theories explain how we learn namely, behaviourism, cognitivism and constructivism discussed in detail below.

2.5.1 Behaviourism

Behaviourism emerged in the early 1900s and became dominant in the early 20th century, initially developed by John B. Watson (Bélanger, 2011). The learning theory states that all behaviours are results or are learned through interacting with the environment (Bélanger, 2011; Skinner, 2011). Behaviour is said to be a response to environmental stimuli, which means it is concerned with observable stimulus-response behaviour (Ertmer & Newby, 1993; Skinner, 2011). Behaviourists are mostly concerned with changes in behaviour that can be measured (Skinner, 2011). Challenges with behaviourism include ignoring thought, motivation and social dimensions of learning (Skinner, 2011).

2.5.2 Cognitivism

Cognitivism theory was initiated in the late 1950s, which is concerned with people as information processors and no longer as a collection of responses to external stimulus as it is with a behaviourist (Bélanger, 2011; Ertmer & Newby, 1993). In a cognitivism theory, learning is characterised by acquiring knowledge; the learner absorbs information, processes it then stores it in their memories (Ertmer & Newby, 1993). Learners are considered to be passive recipients of knowledge (Ertmer & Newby, 1993). The challenges with cognitivism: the focus is on internal knowledge conceptualisation and it places the emphasis on the instructors to engage learners (Brieger, Arghode, & McLean, 2020).

2.5.3 Constructivism

Constructivism theory made its mark between the 1970s and the 1980s, introducing the notion that learners are constructors of their knowledge as they interact with the environment and reorganise their mental structure (Bednar, Cunningham, Duffy, & Perry, 1992). Within constructivism, theory learners are not only passive recipients of information, but they make sense of the knowledge (Mayer, 1996). This moves them from "knowledge-acquisition" to "knowledge construction" (Mayer, 1996). Challenges with constructivism: the role of the instructor changes from that of an expert to being more of a facilitator which may be difficult for some instructors (Misra, 2020; Yilmaz, 2008). Students need to take an active role in their learning and assessment (Misra, 2020; Yilmaz, 2008).

Table 1 - Summary of Behaviourism, Cognitive and Constructivism (Ertmer & Newby, 1993; Mayer, 1996; Skinner, 2011)

	Behaviourism	Cognitive	Constructivism
View of knowledge	Respond to environmental stimuli.	Knowledge- acquisition	Knowledge-construction
View of learning	Passive recipients of knowledge as a result of repetition and positive reinforcement.	Absorb information, process and store processor in memory.	Construct their learning

2.5.4 Connectivism

For the longest time, the three dominant and most utilised learning theories were behaviourism, cognitivism, and constructivism. However, with technological changes shaping how learning occurs, learning theories had to be adapted too (Siemens, 2005).

González (2004, p. 9) describe the notion of rapid changes in the knowledge of life:

> "One of the most persuasive factors is the shrinking half-life of knowledge. The "half-life of knowledge" is the time span from when knowledge is gained to when it becomes obsolete. Half of what is known today was not known 10 years ago. The amount of

knowledge in the world has doubled in the past 10 years and is doubling every 18 months according to the American Society of Training and Documentation (ASTD). To combat the shrinking half-life of knowledge, organizations have been forced to develop new methods of deploying instruction".

With technology connecting people, learning theories are also adapting to the digital age. Therefore, two theorists George Siemens and Stephen Downes introduced *connectivism* as the new theory that will better explain how learning occurs in the connected world of technology (Siemens, 2005). These technologies may include YouTube, the internet, blogs, social media and Wikis. Downes (2007) states "at its heart, connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks" (Siemens, 2005). This learning theory describes the effect of technology in a manner how people connect, communicate and construct their knowledge in digitally connected communities (Ng, 2016). However, connectivism has received criticism as a learning theory because its underlying principles can be drawn from constructivism theory, which is considered fit for the purpose (Goldie, 2016).

2.6 The study adopted learning theory

Learning theories guide and explain how learning takes place, this research has engaged with the different learning theories and identified the learning theory the study subscribes to. With online learning, instructors are still taking the active role of facilitating learning and students' role being that of constructing their learning (Bednar et al., 1992). Students are not only acquiring knowledge buy the move to construct their learning(Mayer, 1996).They are to take an active role in their learning therefore, this study subscribes to the constructivism learning theory.

2.7 Summary of the chapter

This chapter focused on previous literature conducted on the how learning takes place and different kinds of interactions that takes place during a learning process. The evolution of online learning was discussed, followed by how universities have used online learning, the impact of Covid-19 on online learning as well as the challenges with online learning. The conceptualisation of social presence, the impact of Covid-19 on social presence and online participation as part of social presence. The last discussion focused on learning theories that are followed in learning and teaching. The next chapter will discuss the theoretical underpinnings of the study used as a lens to understand the phenomenon of interest.

3 THEORETICAL BACKGROUND AND RESEARCH MODEL

This section focuses on the theoretical underpinnings of the conceptual research framework to explore the social presence, digital skills and digital competencies necessary for South African university online learning. The study draws from the General Technology Competency and Use (GTCU) framework and the Social Presence Theory.

3.1 General Technology Competency and Use (GTCU) Framework

The goal is to determine how digital skills, digital competencies and social presence impact South African university online learning underpinned by the general technological competency and use (GTCU) framework. The initial design of the framework was to study the digital abilities of Canadian teachers, but over time it was reconceptualised to examine professors' and students' digital competency at a Canadian science and technology university (Desjardins, Lacasse, & Bélair, 2001). The framework consists of twenty-six (26) categorized activity items namely; five (5) technical and seven (7) for each of the following concepts respectively; social, informational and epistemological order (Desjardins, 2017). Each activity item measures the frequency of use and confidence of use as indicators for digital competency (Desjardins, 2017).

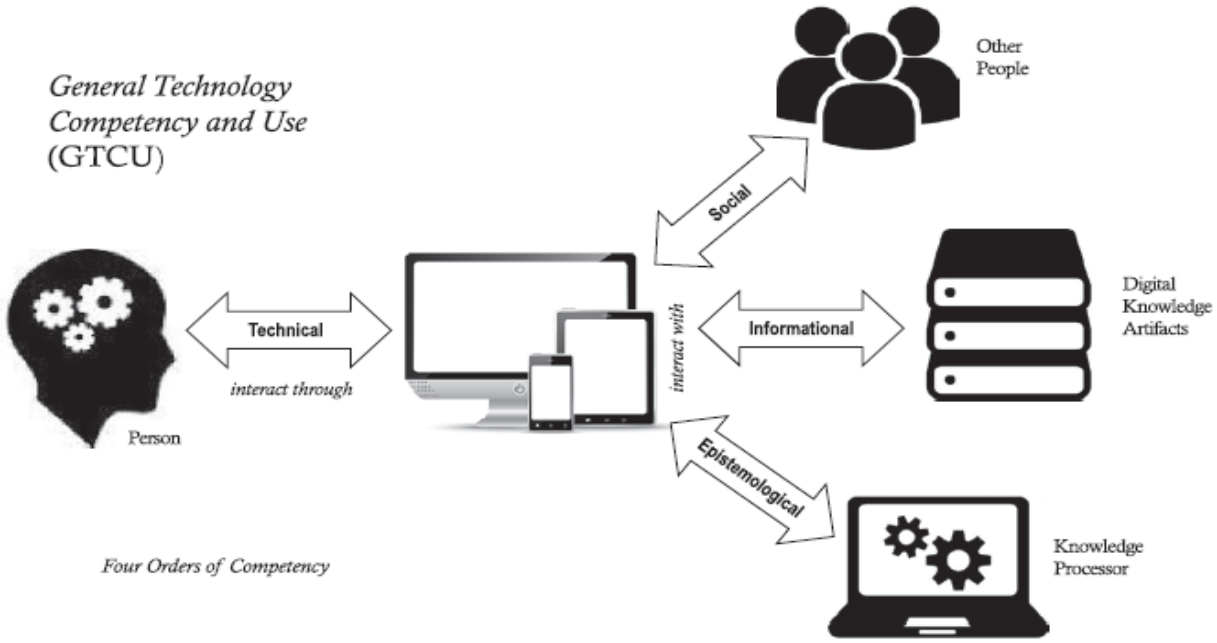
Coward (2020) summaries the several digital competency frameworks used in the past.

- *Digital Competence Framework for Citizens (DigComp) was published by the European Commission's Joint Research Centre in 2013 then revised in 2017.*
- *The Digital Literacy Global Framework (DLGF) was developed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2018 to make the DigComp more applicable in developing countries.*
- *Digital Skills to Tangible Outcomes (DiSTO) was developed by a group of researchers at the London School of Economics, under the leadership of Alexander van Deursen and Jan van Dijk's original work in 2009 further revisions were made.*
- *New Essential Digital Skills Framework was developed by The United Kingdom (UK) Department of Education in 2018 to support adults in enhancing their digital skills.*

The GTCU framework is an extensively theorised and operationalised digital-competency framework developed in a fully online university context by (FJ Desjardins, 2005; Desjardins & Peters, 2007; Desjardins et al., 2001). The GTCU framework conceptualises digital-technology abilities across three main dimensions namely: Social, Informational and Epistemological, and Technical was added as the secondary dimension as indicated in Figure 2 (FJ Desjardins, 2005). The framework remains stable over time regardless of constant changes within digital technologies and human motivations to use technology (Barber et al., 2016; DiGiuseppe, Childs, Blayone, & Barber, 2017; DiGiuseppe, Partosoedarso, Van Oostveen, & Desjardins, 2013; Fabregas, Gapasin, Inovero, Albano, & Canlas, 2020). The framework offers researchers a streamlined model suitable for surveying digital readiness or digital competencies levels of individuals and groups for technology-enhanced working and learning. It has been selected for its strength to measure digital competencies within an educational context.

The GTCU Framework illustrated in Figure 2 will be further discussed in this section.

Figure 2 - Figure 2 - General Technology Competency and Use (GTCU) Framework (Blayone, Mykhailenko, Vanoostveen, Grebeshkov, Hrebeshkova, & Vostryakov, 2018b)



3.2 Orders of Technology Competency

The following section expands on the four orders of the GTCU framework.

3.2.1 Technical Competency

Technical competency refers to the basic skills developed while operating a device, software managing account or a system. (Blayone et al., 2018b). It includes practical knowledge development while experiencing technology and applying the usable methods to interact effectively and efficiently with the technology (Blayone et al., 2018b). Technical competency is built through operating a device or a system while performing a complex task such as editing audio and videos (FJ Desjardins, 2005). Technical competency is a prerequisite to successfully apply or perform social, informational and epistemological competency (Blayone et al., 2018b).

3.2.2 Social Competency

Social competency is the user's ability to interact with other users online, the practical knowledge one develops to communicate with others in a respectful, ethical, safe and viable manner (Blayone, Mykhailenko, Kavtaradze, Kokhan, vanOostveen, & Barber, 2018a). Students acquiring social competency skills allows interaction with other users (students or instructors) in an online learning environment, therefore being able to experience social presence.

3.2.3 Informational Competency

The user's ability to interact with information is regarded as informational competency. When a user can develop and learn how to access, identify, select, organize and interpret information (Blayone et al., 2018a; Blayone et al., 2018b; DiGiuseppe et al., 2017). Informational competency is developed when a user can access and create articles, videos, music or books and use digital maps, such as Google Maps (Blayone et al., 2018a).

3.2.4 Epistemological Competency

Epistemological competency refers to the user's ability to employ both practical and theoretical knowledge to transform data through digital technologies to solve problems or to perform particular tasks (Blayone et al., 2018b; DiGiuseppe et al., 2017). When a user has skills and can use digital technologies (such as spreadsheet, databases, photo or music editing systems or any other information process software, including programming languages and authoring systems) to automatically transform or process different types of data to solve problems or to accomplish specific tasks (Blayone et al., 2018a; Blayone et al., 2018b; DiGiuseppe et al., 2017). Students' ability to make use of information processing tools and in the process construct their learning while trying to either solve a problem or to accomplish a specific task. In that process, they are following the constructivism learning theory.

3.3 Social Presence Theory

Short et al. (1976) conceptualisation of social presence as the way people interact and communicate is determined by the quality of the medium of communication used (Lowenthal, 2009). However, Garrison, Anderson and Archer (1999, p. 94) further reconceptualise social presence as "the ability of participants in a community of inquiry to project themselves socially and emotionally, as ``real" people (i.e., their full personality), through the medium of communication being used". Garrison et al. (1999) does not believe that the media used to communicate is the most salient factor to determine the degree of social presence among participants. Rather, the context of communication created through "familiarity, skills, motivation, organisational commitment, activities, and length of time in using the media directly influence the social presence that develops" (Garrison et al., 1999, p. 95). The definition of social presence has evolved and reconceptualised. For the study, the adopted definition of social presence "is a student's sense of being in and belonging in a course and the ability to interact with other students and an instructor although physical contact is not available" (Picciano, 2002, p. 22).

Tu and McIsaac (2002) proposed three dimensions of social presence: social context, online communication and interactivity, discussed below.

3.3.1 Social Context

Social context is concerned with the type of tasks, user's perception of privacy, the topic and social relations, which could affect the degree of social presence (Tu, 2001, 2002). Tu (2001) and Tu and McIsaac (2002) claimed that if a user perceives a setting less private it may lead to the user's decreased sense of social presence.

3.3.2 Online Communication

Online communication refers to the attributes of the language used online and how the online language is applied (Tu & McIsaac, 2002). Users on an online platform should at least possess some level of computer communication literacy such as being able to type, read and write (Tu & McIsaac, 2002). Additionally, users need training on using digital learning technology to maintain a successful and collaborative learning environment (Tu, 2001).

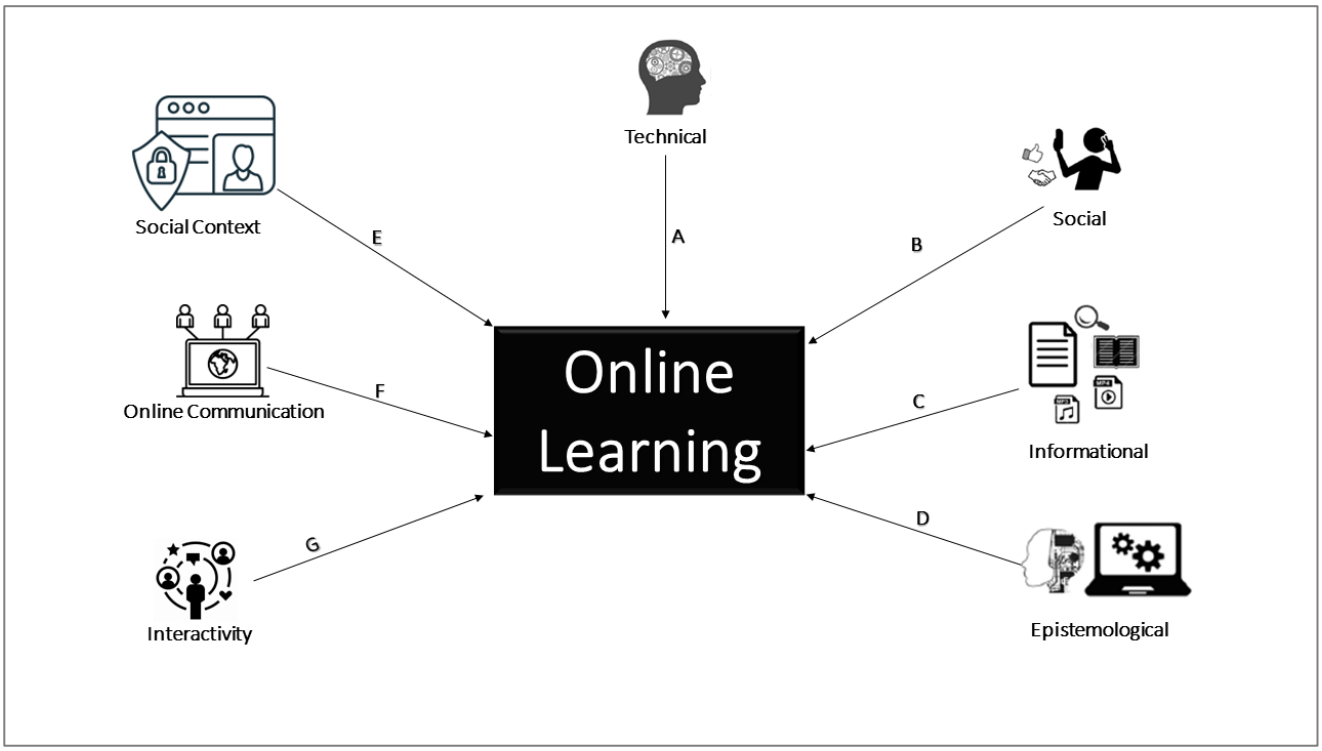
3.3.3 Interactivity

Interactivity is concerned with online activities engaged in by users and the communication styles used (Tu & McIsaac, 2002). Additionally, immediate response and potential for feedback are all components of interactivity (Tu & McIsaac, 2002). When a user receives an immediate response they are likely to be interactive in an online communication platform (Tu, 2000; Tu & McIsaac, 2002).

3.4 Conceptual Research Framework

The research follows an interpretive philosophy therefore a hypothesis will not be formulated.
A positivist paradigm is the research philosophy that relies on hypothesis formulation and testing(Kivunja & Kuyini, 2017). The conceptual research framework shows how social presence, digital skills and digital competency improve university online learning, as indicated in Figure 3. The literature review, findings of the background to the field of study and the research problem were instrumental in formulating the elements of the conceptual research framework presented in Figure 3.

Figure 3 - Conceptual Research Framework



Conceptual Research Framework Element

- Technical Competency – this element represented by the letter A is related to the technical ability of the student to use the learning digital technologies for online learning. The element is closely related to digital skills and digital competencies.
- Social Competency – this element represented by the letter B is related to the student's ability to engage with others in an online learning environment and the practical knowledge they develop to communicate with others with respect, ethical, safe and viable

manner. When student have developed social competency, they can therefore be able to engage with their online class peers and experience social presence.

- Informational Competency – this element represented by the letter C is related to how a student can develop and learn how to access, identify, select, organise and interpret information that is available online for learning purposes. This element leads to students acquiring digital skills and digital competencies.
- Epistemological Competency – this element represented by the letter D considers the student's ability to use digital technologies such as a laptop or a smartphone to automatically transform or process different types of data to solve given problems or to accomplish specific tasks. The ability to use the online learning platform to write an exam or complete a tutorial exercise. This competency improves students' digital skills and digital competencies
- Social context – this element represented by the letter E is related to the task type, perception of privacy, topics and the social relation that could have affected the degree of social presence. When students can perceive privacy within their online learning environment, they can engage effectively and feel a sense of belonging to their online class.
- Online communication – this element represented by the letter F is concerned with the language used online, how it is applied and the training of the users of the online learning platform to ensure successful and collaborative learning. Online communication is necessary for engaging on social media platform and as a result student gain a sense of belonging.
- Interactivity – this element represented by the letter G is concerned with the online activities' users engage in and the communication styles used. Immediate response can lead to users being interactive and engaging in an online learning class. When student can interact effectively online then they feel as part of the community, that enhance their social presence experience.

3.5 Summary of the chapter

This chapter engaged with the General Technology Competency and Use (GTCU) framework and the Social Presence Theory as a lens to explore digital skills, digital competencies and social presence for South African university online learning. The GTCU framework has been used successfully over time to investigate digital readiness for students and instructors (Barber et al., 2016; Blayone, van Oostveen, Barber, Digiuseppe, & Childs, 2017; Blayone et al., 2018a; Blayone et al., 2018b; FJ Desjardins, 2005; Desjardins et al., 2001). The assumptions of the theory state that there are three foundational 'orders' of digital competency (epistemological, informational and social) and a secondary technical order (Blayone et al., 2017; FJ1963406 Desjardins, 2005; Desjardins & Peters, 2007; Desjardins et al., 2001). The digital competency orders support the effective functioning of digital learners(Blayone et al., 2017). Also, the Social Presence Theory has been successful in examining the relationship between social presence and interaction in an online class Tu and McIsaac (2002), Building a modern online social presence and its instructional design implications for future trends Cui, Lockee and Meng (2013) online learning migration from social learning theory to social presence theory in computer-mediated communication (CMC) Tu (2000).

Therefore, this chapter discussed the framework and the theory underpinning the study and subsequently presented the conceptual research framework used as a lens to guide the study process. The next chapter will focus on the research methodology followed in the study.

4 RESEARCH METHODOLOGY

4.1 Introduction

The previous chapters focused on the research framework used to answer the research questions. This chapter outlines the research methodology followed in this study. The chapter is organised as follows; Research paradigm, Research approach, Research design, Research Strategy, Population and Sampling, Data Collection Methods, Data Analysis Methods, Rigour of the Research, lastly, the Ethical Consideration associated with the study.

4.2 Research paradigm

Researchers have different ideas on the kinds of research questions to ask and the different processes they follow to answer those questions(Oates, 2005).The way researchers answer those questions is guided by their different views about the nature of the world they live in and how they might investigate it (Bhattacherjee, 2012; Oates, 2005; Saunders & Lewis, 2012). A research paradigm can be defined as "a set of shared assumptions or ways of thinking about some aspect of the world" (Oates, 2005, p. 182).

The following research paradigms will be discussed below namely, positivism, critical realism, pragmatism and interpretivism.

4.2.1 Positivism

A positivism paradigm is considered the oldest paradigm, which follows the position of the natural scientist (Oates, 2005; Saunders & Lewis, 2012). It is a research philosophy similar to those used in physical and natural science (Saunders & Lewis, 2012) . A positivist researcher prefers working with an observable social reality, whereby the end product of that research can be law-like and generalisation is said to be similar to those that are produced by the physical and natural scientist (Remenyi, Williams, Money, & Swartz, 1998). Additionally, a positivist researcher is most concerned with studying and creating knowledge that could be observable and measurable variables in a particular well-regulated condition (Bhattacherjee, 2012; Saunders & Lewis, 2012).

A positivist researcher follows two basic assumptions; 1) “our world is ordered and regular, not random” and, 2) “we can investigate the world, its regular laws and patterns, objectively” (Oates, 2005). The assumption is that the laws, together with the patterns of our world, exist independently without individual thought processes (Oates, 2005) . Meaning our learning of the world is not dependent on who we are or what we might have personally experienced. We can put our personal feelings aside while being objective and rational in finding out how the world works (Oates, 2005). Wilson (2014)Argues that if a researcher follows a positivist approach, they are independent and purely objective of their research. By being independent, the researcher maintains minimal interaction with their research participants when they conduct research (Bhattacherjee, 2012; Wilson, 2014). However, building rapport with participants has shown to be extremely valuable to understanding people’s world views which enhance our understanding of how the world works.

A positivist uses data collecting methods that include laboratory experiments, surveys, field experiments, secondary data analysis and case research aimed at theory or hypotheses testing (Bhattacherjee, 2012). This researcher employs a deductive approach to research whereby the study begins with a theory and tests theoretical propositions using empirical data (Bhattacherjee, 2012; Saunders & Lewis, 2012). A deductive research approach consists of the following five stages; 1) “defining research questions form a general theory that exists, 2) specify how the questions are to be answered, 3) seeking answers to those questions, 4) analysing the results to determine where they support the theory or suggest modifying the theory then lastly 5) confirm the initial general theory or modify it in light of the findings” (Saunders & Lewis, 2012, p. 108). Positivist research predominantly uses quantitative data, often involving numeric scores and metrics analysed using regressions.

A positivist paradigm successfully studies the natural world we live in, but it tends to have limitations when studying the social world(Oates, 2005). The way we view the world, we see and do things, our cultures, norms and the patterns of our behaviour is developed and modified by people (Oates, 2005).

4.2.2 Critical Realism

Critical realism state that the real world cannot be observed and it exists independent from human perceptions, their theories and their constructions (Saunders & Lewis, 2012). Critical realism takes the ontological position that social structures are real and they exist independently of our perception of them (Saunders & Lewis, 2012; Volkoff & Strong, 2013). A critical realist argues that "we experience in the world are sensations, the images of the things in the real world, not the things directly" (Saunders, Lewis, & Thornhill, 2009, p. 668). Critical realism is with mechanisms that generate events that may not be observable (Tao, 2013; Volkoff & Strong, 2013). The main aim of critical researchers is to focus on the power dynamics, the conflicts and the contradictions that may exist in our modern world. Their reasoning is on helping eliminate the power dynamics, conflicts and contradictions as causes of alienation and domination (Oates, 2005).

4.2.3 Pragmatism

Pragmatism is a position that argues that the most important determinant of the research philosophy adopted is the research question, arguing that it is possible to work within both positivist and interpretivist positions. It applies a practical approach, integrating different perspectives to help collect and interpret data (Saunders et al., 2009, p. 678). A pragmatism paradigm states that it is possible to use both qualitative and quantitative methods within one study, and it may be highly appropriate (Saunders & Lewis, 2012).

4.2.4 Interpretivism

An interpretive research paradigm, on the other side, has a different way of viewing the nature of our world (ontology) and the way we go about acquiring knowledge about it (epistemology) (Bhattacherjee, 2012; Oates, 2005). Interpretive research advocates the necessity to study and understand the differences among individuals on their roles as 'social actors' (Saunders & Lewis, 2012). This paradigm relates to the study of 'social actors' in their natural settings (Oates, 2005). If a researcher intends to understand what is occurring in a particular organisation, the researcher must conduct the research in the organisation among its 'social actors' (Saunders & Lewis, 2012).

Assuming an organisation has adopted a customer relationship management system (CRM), the researcher intends to study employees' (social actors) perceptions of the CRM. The researcher will need to conduct the study in the organisation. Interpretivist researchers believe that there are 'multiple subjective realities', meaning there is no single version of 'the truth' (Oates, 2005). Different people or cultures construct knowledge differently in their minds, and their view of the world is different (Oates, 2005). In addition, researchers are not neutral, possessing their assumptions, beliefs and values, which means that their values play a part in the research process (Oates, 2005; Saunders & Lewis, 2012). Furthermore, Interpretivist research believes that there are multiple interpretations to a phenomenon, meaning they do not expect to arrive at a fixed explanation on their study (Oates, 2005).

Oates (2005, p. 292)argues that "interpretive research in IS and computing is concerned with understanding the social context of an information system: the social processes by which it is developed and constructed by people and through which it influences, and is influenced by, it's social setting". Unlike positivist research, where the aim is to prove or disprove a hypothesis, an interpretive study aims to identify, explore and explain how all factors in a particular social setting are related and independent (Oates, 2005). Also, a critical realist sees the "real" world as something that cannot be observed, existing independently from the human perception, contrary to an interpretivist. Within an interpretive study, the researcher focus on how people view the world (individually or as a group) then tries to understand the interested phenomena through the meanings and values those individuals or groups assign to them (Oates, 2005). A pragmatist believes in the possibilities of working with both positivist and interpretivist positions. The study is interested in exploring the different individuals within their natural setting, making the pragmatism philosophy unsuitable for this research study.

The interpretive study relies heavily on qualitative data, but sometimes it can employ a mixed-mode design that combines qualitative and quantitative (Bhattacherjee, 2012; Saunders & Lewis, 2012). A mixed-mode design is used to generate unique insights into a complex social phenomenon (Bhattacherjee, 2012). Therefore, the study followed an interpretive research philosophy to answer the research question. An interpretive research approach was considered suitable to gain a deeper understanding of individual students' digital skills and digital competencies together with their social presence experiences in an online learning environment.

4.3 Research approach

There are different research approach types that a researcher may follow namely, deduction, induction, retroductive and abduction. The different approaches will be discussed below.

4.3.1 Deduction

A deductive research approach is concerned with testing a theoretical proposition using a research strategy designed for its testing (Saunders & Lewis, 2012). The deductive research approach commences with a theory often developed from reading academic literature then a research strategy is designed to test the theory (Saunders et al., 2009).

4.3.2 Induction

An inductive research approach involves the development of a theory resultant from analysing data that has been collected (Saunders & Lewis, 2012). Firstly, the researcher collects data to explore a phenomenon of interest and then generates or builds a theory, feasibly a conceptual framework (Saunders et al., 2009).

4.3.3 Retroductive

Blaikie (2000, p. 19) define retroductive as a research strategy that starts with "an observed regularity but seeks a different type of explanation". The explanation is, therefore, achieved "by locating the real underlying structure or mechanism that is responsible for producing the observed regularity" (Blaikie, 2000, p. 19). A retroductive approach is said to combine elements from both the deductive and inductive research approaches (Hartig, 2011). Olsen (2012) reviews retroductive as a researcher asking three questions; *why these data*, *why things occurred in that way*? *And how do people interpret these things?* In that way, the research tries to understand why people see certain things as they do (Olsen, 2012). Byrne (2011) also support the notion of observing what has happened to understand why it happened. The researcher begins from the 'effect from what is then work backwards to find the best explanation of why it happened the way it did which will seem to fit the facts (Byrne, 2011).

4.3.4 Abduction

In an abductive research approach, the researcher will start by collecting data to explore a phenomenon of interest, then identify common themes and explain patterns; the goal is to generate a new or modify an existing theory, tested through the additional data collected (Saunders et al., 2009). This interpretive study followed an abductive research approach started from the conceptual model, then collected data that was used it to verify the relationships among the concepts in the framework. Therefore, the study is modifying an existing theory then subsequently justifying its need through additional data collected.

4.4 Research Design

Research design is an outline of how the data will be collected to answer the research questions identified, the method and the approach that will be followed and lastly how the data will be analysed (Bhattacherjee, 2012; Saunders & Lewis, 2012). The study followed an exploratory design to gain new insights, answers new questions and assesses the research topic in a new light (Saunders & Lewis, 2012). An exploratory study is suitable to gain new insights into a particular problem, phenomenon or behaviour (Bhattacherjee, 2012; Saunders & Lewis, 2012). It is conducted to discover general information about a topic not clearly understood by the researcher(Saunders & Lewis, 2012) . Exploratory designs are useful to answer 'why, how or what is happening' questions into a new area of inquiry where a researcher can understand the depth of that particular phenomenon or problem (Saunders & Lewis, 2012). Three popular research methods can be used namely, *quantitative method, qualitative method and lastly, mixed method.*

Quantitative research methods include numerical values that can be measured and analysed using statistical techniques (Saunders et al., 2009; Saunders & Lewis, 2012). This research method is often associated with positivism philosophy and a deductive approach is used where the main focus is to test a theory using the collected data (Saunders et al., 2009). Lastly, the research strategies often linked with the quantitative method are surveys and experiments(Saunders et al., 2009).

The benefit of using the quantitative method is the ability to generalise findings to a whole population because of a larger sample that is randomly selected(Bhattacherjee, 2012; Rahman, 2020). Data analysis within a quantitative method takes less time because of the use of statistical software(Rahman, 2020). However, the limitations of using the quantitative method include not being able to ascertain deeper meanings and explanations(Rahman, 2020).

The second research method is qualitative which can be text or non-text and it is often associated with an interpretive philosophy(Saunders et al., 2009; Saunders & Lewis, 2012). This research method may follow an inductive or deductive approach depending on whether the research is intending to develop a theory or testing an existing theory(Saunders et al., 2009). A qualitative method may adopt a variety of research strategies such as action research, case study research, ethnography and grounded theory to name a few(Bhattacherjee, 2012; Saunders et al., 2009).

The advantage of using the qualitative method is the detailed description of the research participant's feelings, experiences and opinions(Oates, 2005; Rahman, 2020). Getting a deeper insight of the research participant in a natural setting(Oates, 2005). However, the limitation of using a qualitative method is using a smaller sample size which may raise generalization issues of the whole population of the research(Rahman, 2020; Weil, 2017). As well as the complexity of interpreting and analysing the data(Rahman, 2020).

The study followed a mixed-method approach whereby data was collected through an online questionnaire (quantitative), interviews and observations (qualitative), which was found suitable to explore the phenomenon and answer the identified research questions (Creswell & Plano Clark, 2018). The use of quantitative findings provided insights on *what* digital skills, digital competencies university students possess and *how* they view social presence in an online learning environment. The qualitative data was useful in answering *why* students might have had challenges or succeeded in applying digital skills, digital competencies and experienced social presence in an online learning environment. The combination of the quantitative and qualitative data allowed the researcher to study the phenomenon in-depth and gain an understanding of the participants in their natural setting (Creswell & Plano Clark, 2018). Moreover, it provided rich data that justifies the need for framework development.

4.5 Research strategy

Research strategy is the overall approach that, if followed, answers the identified research questions (Bhattacherjee, 2012; Oates, 2005). Popular research strategies within interpretive designs include case study, action research and ethnography (Bhattacherjee, 2012). Professionals use action research when the intention is to investigate and improve their own working practice (Bhattacherjee, 2012; Oates, 2005). Meanwhile, ethnography is concerned with describing people or culture (Bhattacherjee, 2012; Oates, 2005). Researchers in an ethnography gather and record data based on the culture they are studying, reflect on the process they followed to understand the culture acknowledge how they could have impacted the culture of the people they are studying, link their observations to previous literature then lastly write the process and findings in a form of academic books or articles (Oates, 2005). Therefore, a case study has been found suitable for the study because it allows an in-depth investigation of the identified research problem which is occurring within a real-life setting over an extended period (Bhattacherjee, 2012).

4.5.1 Case Study

Case studies are used to investigate a particular contemporary topic within its real-life context, evidence is gathered from multiple sources of evidence (Saunders & Lewis, 2012; Yin, 2009). It focuses on a particular instance of the 'thing' investigated, be it an individual, an organisation or a business unit (Oates, 2005). The instance is studied in-depth, researcher gains a deeper understanding of the research context and the activity taking place in that context (Bhattacherjee, 2012; Oates, 2005; Yin, 2009). Case studies often use different data collection methods to triangulate multiple sources of data (Saunders & Lewis, 2012). Case studies are mostly used in exploratory and explanatory research to answer *why*? *what*? and *how*? Questions (Oates, 2005; Saunders & Lewis, 2012).

Creswell, Hanson, Clark Plano and Morales (2007, p. 245) summarise case study research as

> A methodology, a type of design in qualitative research, and an object of study and a product of the inquiry". Further, mentioned that it has the following features: "Case study research is a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audio-visual material, and documents and reports) and reports a case description and case-based themes.

Therefore, a case study has been found suitable to explore a single case (Wits University) of South African university students' digital skills, digital competencies and social presence using online learning. The selected case strategy allowed the researcher to collect in-depth data from multiple sources to answer the research questions.

4.5.2 Description of the Case

First-year university students studying at the University of the Witwatersrand and staying at the university residence were the case in this study. Due to the Covid-19 pandemic, the university management prioritised first-year students and students from difficult home environments (Wits, 2021b). Each of these students requires funding to pay for their studies. The majority of the students rely on government funding (NSFAS) awarded to students from households with a combined income of not more than R350 000 per annum (NSFAS, 2021). During the research period, (2021) a total number of 295380 first-year university students were awarded the NSFAS bursary (NSFAS, 2021). A total number of 9474 NSFAS recipients were Wits university students (NSFAS, 2021). Bursaries fund some students, while others are self-funded, where their parents or guardians are responsible for paying their fees.

Some of the challenges experienced by students at the residence are issues of funding and possible exclusions should they not meet their academic requirements. Furthermore, the application of loan devices (laptops) was only opened on the 26th of February 2021, when online classes were set to resume on the 8th of March 2021 (Wits, 2021a). Qualifying students

necessitating a loan device also needed to be from an annual combined household income of not more than R600000 or be funded by bursary or scholarship (Wits, 2021a) The delay in receiving loan devices negatively impacted students' access to online learning. Moreover, with the COVID-19 lockdown regulations, students had limited social interactions with their peers, which posed a challenge to their social presence.

The research was conducted in South Africa at the University of the Witwatersrand, located in the Metropolitan City of Johannesburg. Due to the nature of the different socio-economic challenges experienced by students regardless of their situation in a Metropolitan City, Johannesburg Wits was selected. Wits is considered developing compared to other universities within the Gauteng province. South Africa is considered a developing country with social-economics issues that may potentially affect online learning, as discussed in the Literature review section. of this study. Previous studies have focused on the adoption and the use of online learning, the impact of socio-economic issues on university learning. Therefore, this research examined university students' digital skills and competencies for online learning and their social presence.

4.6 Population and Sampling

4.6.1 Population

Population is defined as "all the people or items (*unit of analysis*) with the characteristics that one wishes to study"(Bhattacherjee, 2012, p. 65). A researcher may choose to generalise a group, for example, organisations, employees in the whole world or places (Bhattacherjee, 2012; Saunders & Lewis, 2012). The population for this study has been drawn from the University of the Witwatersrand. The population was selected from a total number of 7561 first-year students (Poyser, 2021) considered to have little to no knowledge of online learning (Chinyamurindi, Mahembe, Chimucheka, & Rungani, 2017). The premise for this selection was to determine their experience of digital skills, social presence and digital competencies and how it affects their online learning.

4.6.2 Sampling

Sampling is defined as “the statistical process of selecting a subset (*called a "sample"*) of a population of interest for purposes of making observations and statistical inferences about that population” (Bhattacherjee, 2012, p. 65) The study used non-probability sampling identified as self-selection. A link for the online questionnaire was distributed to all registered first-year students at Wits University using the university Students Information Management System (SIMS). Students received a link to participate in the questionnaire, a link for participation in a research interview was included in the email. A total number of 127 students responded to the questionnaire, included in the analysis. Seven (7) students participated in the semi-structured interview, and their responses were recorded.

4.7 Data Collection Methods

Data collection is the method a researcher will use to gather data on the phenomenon of interest to answer the identified research questions (Bhattacherjee, 2012). In a case study, research interviews, observations, pre-recorded documents and questionnaires are used (Bhattacherjee, 2012). For this research data was collected at Wits University through observations, an online questionnaire, and semi-structured interviews. The use of an online questionnaire, semi-structured interviews and observation provided for data triangulation (Creswell & Plano Clark, 2018).

4.7.1 Time dimension

The data was collected over three months, between September and November, identified as a cross-sectional time dimension (Saunders & Lewis, 2012). A cross-sectional is when a particular study topic is conducted over a particular time, i.e. a ‘snapshot’ and data is collected from participants at only one period in time (Saunders & Lewis, 2012).

4.7.2 Online questionnaire

A questionnaire is a set of questions in which each person is asked to answer the same set of questions in the same order (Saunders & Lewis, 2012). This study used close-ended questions and one open-ended question. A Qualtrics online questionnaire survey was distributed as a link to all the Wits University students via the Student Information Management System (SIMS) access was granted by the Registrar. SIMS is managed under the Academic Information and Systems Unit (AISU).

a. *Measurement of construct*

Operationalisation has to do with the process where indicators or items are developed to measure the identified theoretical construct (Bhattacherjee, 2012). The operationalisation processes that was followed consist of 1) the researcher defining operation definition of the construct, 2) literature review was conducted to determine any existing measurers that were adapted to match the operational definition of the construct (Bhattacherjee, 2012). Content validity is defined as the extent that a measurement instrument matches the construct intended to be measured(Bhattacherjee, 2012).

The questionnaire items that were employed were drawn from previous studies which have been tested and validated. Twenty-four question from the GTCU Framework which have been tested and validated by research in education (Barber et al., 2016; Desjardins, Bullock, DiGiuseppe, & Robertson, 2010; Desjardins & VanOostveen, 2015; DiGiuseppe et al., 2017; DiGiuseppe et al., 2013).Fourteen questions adopted from social presence theory which have been applied in research about higher education institution by Spears (2012); Cuda (2016); Weinberger and Shonfeld (2020). ENREF 166 A comprehensive list of the items that were used in the final data collection is on Appendix F Online Questionnaire.

The first part of the questionnaire had items relating to different constructs that have been theorised in determining user's GCTU competencies *(Technical, Informational, Social and Epistemological*) (FJ Desjardins, 2005; Desjardins & Peters, 2007; Desjardins et al., 2001). The second part of the question also had items relating to different constructs that have been theorised to determine user's social presence experience relating to *online communication, social*

context and interactivity (Spears, 2012). All the construct used on the questionnaire have been comprehensively explained in Section 3.4. Additionally, the measurement of each construct is well explained in chapter 5 of the research.

The questionnaire collected four sets of data: (a) demographic information; (b) Exposure to online learning, if yes (where was it); How is online accessed (digital device access) and the internet service provider used. (c) confidence in performing digital activities relating to the four GTCU competencies, measured on 5-point Likert scales. Knowledgeable at all, Slightly knowledgeable, Moderately knowledgeable, Very knowledgeable and Extremely knowledgeable; (d) Questions relating to Social Presence using the three constructs (*Online Communication, Social Context and Interactivity*) asked the most recent online course experiences measured on 5-point Likert scales. Strongly Disagree, Somewhat disagree, Neither agree nor disagree, Somewhat agree, Strongly agree.

4.7.3 Interview

An interview is a particular kind of conversation that occurs between people where the researcher controls both the agenda and the proceedings (Oates, 2005). The researcher asks most of the questions to gain information from the interviewee (Oates, 2005). The interviewer takes notes to ensure that important comments are captured and the behavioural response of the interviewee (Bhattacherjee, 2012; Oates, 2005).The interview is often recorded and the interviewee is requested for consent to record the session(Oates, 2005).

A researcher can conduct three types of interviews to gain deeper insight into a phenomenon; structured, semi-structured or unstructured interviews (Oates, 2005; Saunders & Lewis, 2012). This study will use semi-structured interviews. A semi-structured interview has a list of themes to be covered and questions to be asked (Oates, 2005). The interviewer may change the order of the questions depending on the flow of the 'conversation' (Oates, 2005). The interviewer asks probing questions during the interview process to achieve adequacy in answering the questions or when the interviewee brings new issues not initially prepared for (Oates, 2005). Interviewees are allowed to speak and provide more detail on the issues raised by the interviewer, therefore introducing the issues that they may think are relevant to the interviewer's themes (Oates, 2005).

Semi-structured interviews were found suitable for the study to allow participants to 'speak their mind' on the subject in question, discovering then checking their views. This was done to get an in-depth investigation of the participants' accounts and their feelings (Oates, 2005).

The interviews were conducted virtually to avoid the further spread of the virus, as per Covid-19 regulations. The interviews took 15-30 minutes using Microsoft (MS) Teams, the process was recorded and securely stored in Microsoft OneDrive online storage. Participants were asked permission to record the proceedings.

4.7.4 Observations

The researcher watches, notes, hear, analyses, imposes and pays attention to a phenomenon of interest using the data collection method called observations (Oates, 2005). The researcher's main aim of using observations as a form of data collection is to find out exactly what people do instead of reporting what they do when being interviewed. During the data collection process, the researcher worked as *Senior Learning Technologist* at the Wits University ICT department, where they interacted with students using online learning. Additionally, the researcher worked as the Wits University *Warden,* expected to provide pastoral care and student development to students staying at the university residence.

The researcher stayed with most first-year students at the university residence where students' interaction with online learning was observed. Both the roles enabled the researcher to observe how first-year students engage with online learning and what issues they might have encountered. Moreover, interventions for students who did not perform well in their studies were conducted. In the process, the researcher discovered that some of the students faced challenges with online learning, especially at the beginning of the year, as it was some of the students' first time interacting with online learning. Through informal discussion engagements about how students were learning online and engaging with the LMS, students shared their experiences. The researcher engaged with the participants as a participant-observer.

4.8 Data Analysis Methods

The data collected from the study was analysed as follows; the online questionnaire was analysed using Qualtrics Survey Tool where descriptive statistics making use of frequency distribution was employed. Thematic analysis was used to analyse data from the semi-structured interview. Thematic analysis is a method used to identify, analyse, organise, describe and report themes found on a data set (Braun & Clarke, 2006). Thematic analysis is usually applied to a set of texts, such as interview transcripts (Nowell, Norris, White, & Moules, 2017). The researcher closely examines the data to identify common themes – topics, ideas and patterns of meaning that come up repeatedly (Flick, 2014; Nowell et al., 2017). The study followed the step-by-step guide to conducting a trustworthy thematic analysis suggested by (Braun & Clarke, 2006). The approach follows six phases wherein Phase 1: the researcher familiarises themselves with the data. In Phase 2: the researcher generates initial codes, Phase 3: searching the themes and Phase 4: the themes are reviewed. Phase 5: include defining and naming the themes and Phase 6: the report is produced (Braun & Clarke, 2006). The identified themes with the corresponding codes which they were formulated from is represented in Table 2.

Table 2 - Codes with corresponding Themes

Codes	Themes
▪ The community students grew up in ▪ The schools they went to ▪ Parent's income condition ▪ Facilities in their neighbourhood ▪ How it influenced online learning	Social-economic background influence on online learning.
▪ Student-Instructor interaction ▪ Student-Student interaction ▪ Covid-19 Pandemic regulation ▪ No physical contact ▪ Reliant on Social Media networks to interact	Social presence for online learning
▪ Ability to find information ▪ Confidently engage in an online learning environment ▪ Being responsible online	Digital competencies improving online learning
▪ Locating information online ▪ Navigating online ▪ Digital skills training	Digital skills improving online learning

4.9 Reliability and Validity

Bhattacherjee (2012) mention that reliability can be achieved when the measure of a construct is consistent or dependable. An example could be using a scale to measure the same construct repeatedly, when the results remain the same within the same phenomenon then the scale is reliable. The reliability of the research elements was measured by the degree of internal consistency, using Cronbach's alpha test with a minimum of a $\alpha>0,7$ as a limit for an acceptable reliability. The Cronbach's alpha rest for the elements was $\alpha= 0.956954206$ which is above the 0.7 therefore, the scale is said to have an acceptable scale reliability.

4.9.1 Validity

Validity refers to the degree in which the data collection method(s) adequately measure what was intended to measure (Saunders & Lewis, 2012). The questionnaire that was used to collect data did measured the elements identified Chapter 3 under the Conceptual Research Framework section. Interpretive research is based on a different ontology and epistemology assumptions about the society unlike positivist research using reliability, internal validity and generalization to measure the rigor of the research. To judge the quality of Interpretivist research Lincoln and Guba (1985) propose a set of criteria used in this study.

Trustworthiness – How much trust can be placed on the research (Oates, 2005)? The research process was detailed to ensure that the output can be trusted, ensuring that an audit trail is available to support that.

Dependability – refers to the good quality recording of the research process and the documentation of the data (Oates, 2005). The data collected from the online questionnaire, recorded and stored in secured online storage, which will be kept for three years. The semi-structured interview was also conducted via a video conferencing tool, MS Teams, and the recordings are kept securely on trusted online storage.

Credibility – a study is considered credible if the readers find the research inferences believable (Bhattacherjee, 2012).The researcher has a prolonged engagement in the problem situation, consulting other data sources such as the data collected from the questionnaire apart from those collected from the interviews. The data from the interviews were triangulated with the data from

the questionnaire and observations. The audio recordings of the interviews are kept within secure online storage, including the responses to the questionnaire.

Confirmability – occurs when the findings reported on the research are independently confirmed by the participants (Oates, 2005). A clear and detailed audit trail that indicate the raw data, summaries, notes and analysis of the entire researcher study will be made available to allow assessment by a research auditor. A clear and detailed audit trail for the interview proceedings has been kept in secure online storage that will make it possible for the findings to be confirmable, if other researchers may decide to conduct a similar study. Additionally, the responses from the online questionnaire are kept and can be confirmed by another researcher or the participants.

Transferability – the ability of the research findings to be generalised in a different setting (Oates, 2005). The research findings can be generalised to first year South African university students staying at university residences with similar social-economic challenges.

4.10 Ethical Consideration

Research ethic refers to the appropriate behaviour of the researcher concerning the rights and privacy of the research participants (Saunders & Lewis, 2012). The study included university students, which required permission to be granted from the University Registrar before data was collected. An ethics application including a participation information sheet found in *Appendix C Participant Information Letter: Interview* and *Appendix D Participant Information Letter: Questionnaire* and a consent letter *Appendix E Participation Consent* detailing the purpose, objective, data collection method made to ensure that proper regulations were followed. The research participants were provided full details of the study and made aware of how their data will be handled to ensure that their privacy, anonymity and confidentiality is maintained during the research process. The research addressed ethical issues in the following manner:

- Voluntary participation and harmlessness - the study participants were made aware that their participation in the study is voluntary. They had the freedom to withdraw from the study at any given time without any unfavourable consequences. Additionally, participants were informed that they will not be harmed as a result of their participation or non-

participation in the study. The study was concerned with the use of online learning by students who will not be negatively or positively affected for participation or non-participation in the study.

- Informed Consent- Participants received and signed an informed consent form that clearly describes their right to participate and a right to withdraw before the recording of their responses. The signed informed consent forms have been safely kept by the researcher. It will be safely kept for three years after the data collection process to comply with the ethics committee regulations.

- Anonymity and confidentiality - The study participant's identity was protected, any identifiable participant information is excluded from the research paper and research report of the data collected from the questionnaire. The study used interviews, and since anonymity is not possible with this data collection method, confidentiality was assured.

- Disclosure - A full disclosure by the researcher stating their relationship with the study, the purpose, the expected outcomes as well as the beneficiaries of the study was made available on the informed consent form and the participation sheet. Participants were also provided with the consent form and the participant information sheet, attached in the appendixes section.

4.11 Summary of the chapter

This chapter discussed the research methodology, including the research paradigm, research approach, research design, research strategy, population and sampling. The methods followed to collect the data and data analysis. Rigour of the research, and lastly, research ethics. The following chapter will focus on analysing the collected data.

5 FINDINGS

5.1 Introduction

The previous chapter focused on the research methodology followed by conducting the study. This chapter discusses the data collected using two methods of data collection. Quantitative data was collected using an online questionnaire and administered using the Qualtrics Survey Tool. The qualitative data employing interviews were collected using MS Teams, an online meeting tool.

5.2 Data Screening

A total of 130 students responded to the online questionnaire. The results were analysed using descriptive statistics to identify the experience of university students using online learning as a mode of learning. The response rate was lower than expected this was because participants had to voluntarily take part in the questionnaire. Email reminders were sent to encourage participation. Out of the 130 responses, 3 of them were incomplete therefore excluded because it had crucial missing data in their responses. The total of 127 responses are included on the analysis.

5.2.1 Missing data

The total number of responses that had to be discarded due to being partially completed were 3 out of the 130. The 3 were then eliminated from the analysis therefore, leaving 127 complete responses

Total Responses	130
Incomplete Responses	3
Complete Responses	127

Table 3 - Handling of Missing Data

5.3 Response Profile

The data below provides a summary of the respondent's profile from their age, gender, the location of their high school, the faculty they are enrolled in, their prior exposure to online learning, the type of digital technology they use to access online learning and lastly the type of their internet connection. The data collected seek to answer research question no 1: *What influence does social-economic background have on online learning?* This was done by analysing the social background of the participants. The location area of their high school and their pre-exposure to online learning before the first year of university learning commences. The type of digital technology used to access online learning if they have any. Furthermore, how they connect to the internet to attend their online classes.

5.3.1 Age Distribution

Table 4 indicates the age distribution of the 127 total participants, with the highest being 19–22-year-olds with a total of 72 participants.

Table 4 - Age

Age	Number	%
Under 15	0	0.00%
15 - 18	47	37.01%
19 - 22	72	56.69%
23 - 26	4	3.15%
27 - 30	2	1.57%
Above 30	2	1.57%
Total	**127**	**100%**

5.3.2 Gender

Of the 127 participants, 78.74% identified themselves as females, 18.90% were males, 1.57% preferred not to say lastly, and 0.79% identified themselves as non-binary/third gender. The data is represented in Table 5.

Table 5 - Gender

Gender	Number	%
Male	21	18.90%
Female	100	78.74%
Non-Binary/third gender	1	0.79%
Prefer not to say	2	1.57%
Total	**127**	**100%**

5.3.3 The location of the high school attended

Table 6 indicates the area where the participants attended their high school. Of the 95 participants who responded to this question, 54.74% came from urban areas, about 22.11% came from peri-urban areas, about 20% came from rural areas, 2.11% came from remote and lastly, 1.05% indicated that they are not sure or do not remember.

Table 6 - Location of the high school attended

Location	Number	%
Urban	52	54.74%
Rural	19	20.00%
Remote	2	2.11%
Peri-Urban	21	22.11%
Not sure/Don't remember	1	1.05%
Total	**95**	**100%**

5.3.4 Faculty

Table 7 indicates that 127 participants who responded to the question were from various faculties, with the highest being Humanities at 38.58% and the lowest being Science 10.24%.

Table 7 - Faculty

Faculty	Number	%
Humanities	49	38.58%
Commerce, Law and Management	32	25.20%
Engineering and the Built Environment	19	14.96%
Health Sciences	13	10.24%
Science	13	10.24%
Other	1	0.79%
Total	**95**	**100%**

5.3.5 Exposure to online learning prior university

The aim of Table 8 was to reflect participants' prior exposure to online learning to ascertain its impact on their current online experience. Of the 125 participants who responded to the question, 54% indicated that they were exposed to online learning before their first year as university students. The remaining 46% indicated that they were not exposed to online learning before they began their first year as university students.

Table 8 - Prior exposure to online learning

Prior exposure to online learning	Number	%
Yes	68	54%
No	57	46%
Total	**125**	**100%**

a. *If yes, where was it?*

The aim of Table 9 was to indicate where students were previously exposed to online learning as 76 of them indicated that they had used online learning before they enrolled at the university. The highest number is from high school at 82.89% for those who answered yes to the previous question

Table 9 - Previously exposed to online learning

If yes, where?	Number	%
High School	63	82.89%
Personal training/development	6	7.89%
College	3	3.95%
Another university	3	3.95%
Other	1	1.32%
Total	**76**	**100%**

5.3.6 Digital Technologies

Table 10 indicates the different digital technologies students use to access their online learning. The highest number being laptops at 54.50% and the lowest being desktops at 36.97%. It should be noted that a student can have more than one digital technology i.e., a smartphone and a laptop. Moreover, first-year students who are funded by NSFAS, bursaries or scholarships were provided with a loan device in a form of a laptop.

Table 10 - Digital Technologies

Digital Technologies	Number	%
Laptop	115	54.50%
Smartphone	78	36.97%
Tablet	9	4.27%
Desktop	9	4.27%
Total	**211**	**100%**

5.3.7 Internet Service Provider (ISP) used to connect to online classes

Table 11 indicated majority of the participants accessed online learning using Vodacom at 30.54% and the lowest was Rain at 4.19%. Furthermore, students were provided Vodacom data by the university, which may explain the higher number of Vodacom users. The 8% that indicated other, have used either their home or university WI-Fi.

Table 11 - Internet Service Provider (ISP) used to connect to online classes

ISP	Number	%
Vodacom	51	30.54%
MTN	42	25.15%
Telkom	35	20.96%
Cell C	18	10.78%
Rain	7	4.19%
Other	14	8.38%
Total	167	100%

5.3.8 Evaluation of students' digital learning competencies

In the section below the researcher, illustrates and discusses the results of the questionnaire where the 5-point Likert scales were used across the elements. The results are presented and discussed according to the literature review and the research questions using the GTCU framework. The data was collected to answer research questions 3: *What influence does digital skills and digital competencies have on university online learning?* The following concepts have been used to answer the questions related to students' digital competencies; *Technical Competency, Social Competency, Informational Competency and lastly, Epistemological Competency.*

Technical competency relates to students' ability to use digital learning technologies to create and edit electronic documents. How to create/edit audio recordings such as podcasts and voice memos. How to create multimedia items such as photographs, movies and slideshows. How to manage their accounts such as for their emails, banks, phone video chat services andTV/movie services. Lastly, how to manage and operate other devices such as home entertainment systems, thermostats, lights, etc.

#	Field	Not knowledgeable at all	Slightly knowledgeable	Moderately knowledgeable	Very knowledgeable	Extremely knowledgeable	Total
1	I have learned how create/edit electronic documents (word processing, presentations, spreadsheets)	4.10% 5	13.11% 16	27.05% 33	34.43% 42	21.31% 26	122
2	I have learned how to create/edit audio recordings (podcasts, voice memos)	17.36% 21	27.27% 33	27.27% 33	17.36% 21	10.74% 13	121
3	I have learned how to create/edit multimedia items (photographs, movies, slideshows)	16.53% 20	23.14% 28	26.45% 32	24.79% 30	9.09% 11	121
4	I have learned how to manage any of my accounts (email, bank, phone, video chat service, TV/movie service, etc.)	3.33% 4	7.50% 9	20.83% 25	35.00% 42	33.33% 40	120
5	I have learned how to manage or operate other devices (home entertainment system, thermostats, lights, etc.)	14.17% 17	13.33% 16	28.33% 34	25.00% 30	19.17% 23	120

Showing rows 1 - 5 of 5

Table 12 - Technical Competency

Participants were asked to reflect on their most recent online course experiences. Table 12 indicate students viewed Microsoft packages such as MS Word, Excel, Powerpoint as easy to use. However, some found applications to create/edit and record audios such as podcasts challenging. The results also indicate that some of the participants have not mastered creating and editing multimedia items such as photographs and videos. Lastly, the majority of the participants indicated that they know how to manage their accounts like their email accounts and to operate other devices which can have some form of impact on their learning should it be required.

Social competency relates to students' ability to interact with others with respect, ethical, safe and viable in an online learning environment.

#	Field	Not challenging at all	Slightly challenging	Moderately challenging	Very challenging	Extremely challenging	Total
4	I can communicate using e-mail.	81.03% 94	11.21% 13	3.45% 4	0.86% 1	3.45% 4	116
2	I can communicate with others using audio (WhatsApp, phone)	82.76% 96	7.76% 9	5.17% 6	0.86% 1	3.45% 4	116
1	I can communicate with others using text chat or text messaging (SMS, etc.)	84.62% 99	6.84% 8	0.85% 1	1.71% 2	5.98% 7	117
3	I can communicate with others using video (FaceTime, WhatsApp)	78.45% 91	11.21% 13	3.45% 4	3.45% 4	3.45% 4	116
7	I can share my works and ideas publicly (blogs [Wordpress], photo sharing [Flickr, Picasa], Pinterest, etc.)	33.62% 39	31.90% 37	16.38% 19	12.07% 14	6.03% 7	116
6	I can use collaboration/shared document tools (Google Drive, Dropbox, etc.)	48.28% 56	27.59% 32	12.93% 15	6.90% 8	4.31% 5	116
5	I can use social networking systems (Facebook, Instagram, LinkedIn, Twitter, etc.)	78.45% 91	11.21% 13	5.17% 6	0.86% 1	4.31% 5	116

Showing rows 1 - 7 of 7

Table 13 - Social Competency

Table 13 indicate students' ability to communicate using social networking such as Facebook, Instagram, WhatsApp or Twitter. Using collaboration or sharing documents applications such as Google Drive and Dropbox, sharing their work publically be it blogs or photos. Also, students' ability to communicate via texts, using audio or video. The majority of the participants indicated that they do not find using social media such as WhatsApp to communicate via audio, text, and video challenging. However, it should be noted that they found sharing their work via blogs such as WordPress and other blogs applications, using collaboration tools such as Google Docs or Google Drive for sharing their documents challenging. With online learning, there is a greater need to work collaboratively with others and only relies on technology to achieve these tasks.

Informational competency relates to a student's ability to interact with information. Bespeaking to their ability to develop and learn how to search, access, identify, select, organise and interpret information for online learning purposes.

#	Field	Not knowledgeable at all	Slightly knowledgeable	Moderately knowledgeable	Very knowledgeable	Extremely knowledgeable	Total
1	I can access digital maps (MapQuest, Google Maps) or a GPS (TomTom, Garmin, etc.)	9.65% 11	5.26% 6	25.44% 29	25.44% 29	34.21% 39	114
2	I can search for journal articles online.	1.77% 2	20.35% 23	23.89% 27	31.86% 36	22.12% 25	113
3	I can search for short videos (YouTube) on the Internet.	2.65% 3	3.54% 4	8.85% 10	29.20% 33	55.75% 63	113
4	I can search for/download movies.	6.19% 7	9.73% 11	15.93% 18	23.89% 27	44.25% 50	113
5	I can search for/download music.	2.65% 3	3.54% 4	10.62% 12	24.78% 28	58.41% 66	113
6	I can search for/download electronic books.	6.19% 7	9.73% 11	22.12% 25	25.66% 29	36.28% 41	113
7	I can use an aggregator to automatically collect and organize documents (news aggregators, RSS feeds etc.).	40.71% 46	23.89% 27	18.58% 21	9.73% 11	7.08% 8	113

Table 14 - Informational Competency

Table 14 indicate students' ability to use digital maps such as Google Maps, search journal articles online, search videos on applications such as YouTube, search and download movies, music and electronic books. Lastly, their ability to automatically collect and organise documents. The results indicate that participants are extremely knowledgeable about searching and downloading videos and music. However, they are slightly knowledgeable on searching for journal articles online on applications such as Google Scholar, which can negatively impact their learning. They are also not knowledgeable on collecting and organising documents which are some of the requirements for their learning activities.

Epistemological competency is the student's ability to use digital technologies to automatically transform or process different kinds of data to solve a given problem or accomplish specific tasks.

#	Field	Not knowledgeable at all	Slightly knowledgeable	Moderately knowledgeable	Very knowledgeable	Extremely knowledgeable	Total
1	I can access digital maps (MapQuest, Google Maps) or a GPS (TomTom, Garmin, etc.)	9.65% 11	5.26% 6	25.44% 29	25.44% 29	34.21% 39	114
2	I can search for journal articles online.	1.77% 2	20.35% 23	23.89% 27	31.86% 36	22.12% 25	113
3	I can search for short videos (YouTube) on the Internet.	2.65% 3	3.54% 4	8.85% 10	29.20% 33	55.75% 63	113
4	I can search for/download movies.	6.19% 7	9.73% 11	15.93% 18	23.89% 27	44.25% 50	113
5	I can search for/download music.	2.65% 3	3.54% 4	10.62% 12	24.78% 28	58.41% 66	113
6	I can search for/download electronic books.	6.19% 7	9.73% 11	22.12% 25	25.66% 29	36.28% 41	113
7	I can use an aggregator to automatically collect and organize documents (news aggregators, RSS feeds etc.).	40.71% 46	23.89% 27	18.58% 21	9.73% 11	7.08% 8	113

Table 15 - Epistemological Competency

This can be seen by students' ability to make use of the LMS to attend classes, complete a tutorial, assignment or an exam Table 15 illustrates students' ability to apply their epistemological competency to use or share a calendar, create and use concept maps or flowcharts, create diagrams and graphs from numeral data. Lastly, sorting large amounts of data, complex calculation and programming. Most of the participants indicated not being knowledgeable on programming at 48%, followed by 20% on sorting large amounts of data. Only about 21% indicated that they can confidently use or share their calendars and moderate knowledge-creating and using plans or diagrams.

5.3.9 Evaluation of students' online interaction and social presence

In the section below, the researcher illustrates and discusses the questionnaire results using the 5-point Likert scales across the concepts. The results are presented and discussed according to the literature review and the research questions using the Social Presence Theory. The following concepts have been used to answer the questions related to students' digital competencies; *Online communication, social context and interactivity.*

Online communication relates to students' ability to apply the language used with online learning platforms to successful learning and online collaboration. Social context relates to the task, the perception of privacy and topics that may affect the degree of social presence.

#	Field	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Total
1	Communication in the courses was impersonal	7.53% 7	13.98% 13	46.24% 43	17.20% 16	15.05% 14	93
2	I feel comfortable conversing in the courses	8.51% 8	25.53% 24	13.83% 13	34.04% 32	18.09% 17	94
3	I feel comfortable introducing myself in the courses	17.89% 17	22.11% 21	10.53% 10	27.37% 26	22.11% 21	95
4	The course introductions enabled me to form a sense of the community	10.64% 10	14.89% 14	21.28% 20	25.53% 24	27.66% 26	94
5	I felt comfortable participating in course discussions	12.63% 12	16.84% 16	20.00% 19	32.63% 31	17.89% 17	95
6	The instructor facilated discussion in the course	4.26% 4	7.45% 7	11.70% 11	30.85% 29	45.74% 43	94
7	I felt that my point of view was acknowledged by other participants in the courses	4.21% 4	4.21% 4	34.74% 33	30.53% 29	26.32% 25	95
8	I was able to form distinct impressions of some students in the courses	9.47% 9	9.47% 9	30.53% 29	30.53% 29	20.00% 19	95

Table 16 - Online Communication & Social Context

Table 16 indicates that 43% of participants felt that their instructor facilitated the discussions on their courses. About 38% indicated that they did not feel comfortable introducing themselves in their course and about 28% felt uncomfortable participating in course discussions. About 24% indicated that the course introduction did not invite a sense of community. Lastly, 46% neither agreed nor disagreed with the communication in the course being impersonal.

Interactivity relates to the communication styles that are used and the online activities users engage in.

#	Field	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Total
1	Courses are an excellent means for social interaction	11.11% 11	17.17% 17	17.17% 17	29.29% 29	25.25% 25	99
2	I felt comfortable interacting with other students in the courses	8.08% 8	16.16% 16	20.20% 20	30.30% 30	25.25% 25	99
3	The amount of interaction with other students in the courses was appropriate	13.13% 13	12.12% 12	18.18% 18	36.36% 36	20.20% 20	99
4	The quality of interaction with other students in the courses was appropriate	10.20% 10	16.33% 16	19.39% 19	35.71% 35	18.37% 18	98
5	The amount of interaction with instructor in the courses was appropriate.	8.25% 8	9.28% 9	13.40% 13	38.14% 37	30.93% 30	97
6	The quality of interaction with instructor in the courses was appropriate.	8.16% 8	6.12% 6	12.24% 12	31.63% 31	41.84% 41	98

Showing rows 1 - 6 of 6

Table 17 - Interactivity

Table 17 indicates students' ability to interact with other students and instructors in their online courses. About 36% of the participants indicated that they somewhat agree with the appropriate amount of interaction with other students and, about 13% indicated they do not interact with their instructors, about 41% indicated they agree, whereas 8% disagreed agree with their amount of interaction with other students in terms of the quality of interaction.

5.4 Descriptive Statistics on digital skills, digital competencies and social presence for online learning.

The digital skills, digital competencies and social presence was conceptualised through seven constructs namely, technical, social, informational and epistemological competency as well as online communication, social context and interactivity.

5.4.1 Technical Competency

Five items were used to measure technical competency. The descriptive statistics indicate that participants were able to create or edit electronic documents, manage their online accounts as well as operating digital technologies. However, some found creating or editing audios challenging.

Table 18 - Descriptive statistics for Technical Competency

Item	Wording	Mean	Std. Deviation
1	I have learned how create/edit electronic documents (word processing, presentations, spreadsheets)	3.56	1.09
2	I have learned how to create/edit audio recordings (podcasts, voice memos)	2.77	1.23
3	I have learned how to create/edit multimedia items (photographs, movies, slideshows)	2.87	1.22
4	I have learned how to manage any of my accounts (email, bank, phone, video chat service, TV/movie service, etc.)	3.88	1.06
5	I have learned how to manage or operate other devices (home entertainment system, thermostats, lights, etc.)	3.22	1.29

5.4.2 Social Competency

Five items were used to measure social competency. The descriptive statistics indicate that participants were able to use social media networking tools, text, audio or video to communicate. They were also able to share their documents using cloud storages. However, they had challenges using blogging software and online collaboration tools. There is a great need for participants to learn how to use online collaboration tools more especially for group work in an online learning environment.

Table 19 - Descriptive Statistics for Social Competency

Item	Wording	Mean	Std. Deviation
1	I can communicate with others using text chat or text messaging (SMS, etc.)	1.38	1.04
2	I can communicate with others using audio (WhatsApp, phone)	1.34	0.89
3	I can communicate with others using video (FaceTime, WhatsApp)	1.42	0.97
4	I can communicate using e-mail.	1.34	0.87
5	I can use social networking systems (Facebook, Instagram, LinkedIn, Twitter, etc.)	1.41	0.96

5.4.3 informational Competency

Seven items were used to measure Informational competency. The descriptive statistics indicate that participants were able to use digital maps, search journal articles online, search videos online, search and download music online. Although, they had somewhat knowledge for searching journal article online which can have a negative impact in their learning.

Table 20 - Descriptive Statistics for Informational Competency

Item	Wording	Mean	Std. Deviation
1	I can access digital maps (MapQuest, Google Maps) or a GPS (TomTom, Garmin, etc.)	3.69	1.26
2	I can search for journal articles online.	3.52	1.1
3	I can search for short videos (YouTube) on the Internet.	4.32	0.96
4	I can search for/download movies.	3.9	1.24
5	I can search for/download music.	4.33	0.98
6	I can search for/download electronic books.	3.76	1.21
7	I can use an aggregator to automatically collect and organize documents (news aggregators, RSS feeds etc.).	2.19	1.26

5.4.4 Epistemological Competency

Seven items were used to measure Epistemological competency. The descriptive statistics indicate that participants were able to use or share a calendar which they interact with on the online learning platform *ulwazi.* They were also able to create diagrams and graphs from numeral data which is also a requirement for some of their assessments. However, some have no knowledge for programming.

Table 21 - Descriptive Statistics for Epistemological Competency

Item	Wording	Mean	Std. Deviation
1	I can use/share a calendar/personal agenda.	3.03	1.42
2	I can create/use concept maps or flowcharts	3.13	1.27
3	I can create/modify/use plans or diagrams.	3.11	1.25
4	I can sort large amounts of data.	2.8	1.31
5	I can create graphs from numerical data.	3.07	1.3
6	I can do complex calculations.	2.93	1.3
7	I can do programming.	1.97	1.23

5.4.5 Online communication and Social Context

Eight items were used to measure online communication and social context. The descriptive statistics indicate that participants felt that their course instructors were able to facilitate discussions on the *ulwazi.* However, some indicated that they did not feel comfortable with introducing themselves in the course which has an impact in them feeling a sense of belonging.

Table 22 - Descriptive Statistics for Online Communication and Social Context

Item	Wording	Mean	Std. Deviation
1	Communication in the courses was impersonal	3.18	1.09
2	I feel comfortable conversing in the courses	3.28	1.26
3	I feel comfortable introducing myself in the courses	3.14	1.44
4	The course introductions enabled me to form a sense of the community	3.45	1.32
5	I felt comfortable participating in course discussions	3.26	1.28
6	The instructor facilitated discussion in the course	4.06	1.12
7	I felt that my point of view was acknowledged by other participants in the courses	3.71	1.03
8	I was able to form distinct impressions of some students in the courses	3.42	1.18

5.4.6 Interactivity

Six items were used to measure interactivity. The descriptive statistics indicate that about 36% of participants were able to interact with other students and their instructors on their online courses. Contrary to 41% of the participants who indicated that they experienced challenges with interacting with other students or their instructors.

Table 23 - Descriptive Statistics for Interactivity

Item	Wording	Mean	Std. Deviation
1	Courses are an excellent means for social interaction	3.4	1.33
2	I felt comfortable interacting with other students in the courses	3.48	1.25
3	The amount of interaction with other students in the courses was appropriate	3.38	1.29
4	The quality of interaction with other students in the courses was appropriate	3.36	1.24
5	The amount of interaction with instructor in the courses was appropriate.	3.74	1.22
6	The quality of interaction with instructor in the courses was appropriate.	3.93	1.23

5.5 Qualitative data from the online questionnaire.

Participants were provided with an opportunity to suggest what could improve their online learning experience. The responses are analysed using the themes that were identified from the conceptual research framework elements, discussed in Section 3.5. Below are the responses from the open-ended question from the questionnaire found in Appendix F Online Questionnaire.

5.5.1 Technical

"Stable connection to the Wi-Fi and more data to use while home"

"Make devices more accessible to learners"

"Universities giving us data on time and lecturers should stop turning off their cameras."

"The internet data will make our online learning very easy."

5.5.2 Interactivity

"More interaction between lecturer and student"
"Live sessions to encourage student participation"
"To be patient with us, for feedback comments to be polite, not harsh, we somehow feel demotivated."

"More live lectures would do the most for us, as they allow direct communication between us the students, and the lectures."
"Live lectures and pre-recorded lectures"

5.5.3 Digital skills

"Online teaching is a new field for most of our teachers. We need every teacher to summarise and summarise in practice and find out the online teaching suitable for our students in reflection and practice."

Summary of the qualitative data from the online questionnaire

The data from the open-ended question suggested that the Wi-Fi connection provided by the university at the students' residence be stable. Furthermore, the data allocation on students' cell phone numbers be increased so that students may continue to access their online learning even when they are not on campus. Additional suggestions related to interactivity within their online classes whereby they would love to see more interaction between instructors and students. Live sessions which will encourage students' participation and direct communication between students and instructors. Lastly, a suggestion relating to digital skills whereby participants would like to see more of online teaching suitable for students as well as an improvement on instructors' digital skills.

5.6 Findings from qualitative data

A total number of 7 (seven) participants took part in the online research interview, administered via Microsoft Teams. The interview process ended with participant number 7 after realising that saturation was reached when participants started giving similar answers. Before the interview process, participant consent to record the interviews was obtained, and the interview sessions were, thus, recorded. The data collected from interviews and the data collected from observation will form part of the analysis.

5.6.1 Social-economic background influence on online learning

The social-economic background will include several issues such as the community the students grew up in, the schools they went to, their parents' income condition, facilities in their neighborhood, influencing how the online learning environment occurs. The different issues have been organised into subthemes for the analysis, which will be discussed below.

a. University provided devices

"Not really, I think every learner have similar advantages and disadvantages. Wits does give students laptops, data and some access to it on campus. But mine was influenced by my background and having access to technology"

b. Family financial ability (parents' exposure to technology)

"Yes it did and it also does influence how I learn online. My parents are middle-class workers, they could afford things like laptops and data most of the time. Right now what is happening, because of online learning I do have computer skills because I used my father's laptop at home and from a very young age. I think I was still in primary school at that time we had a desktop computer and we also had a laptop. So he started teaching me how to use a laptop from a young age and I also didn't struggle with data, so every time I needed data he will just top me up"

"Yes, it does. Because my social background would determine if I have the knowledge or the skills to you to use computers. So if I'm unable or if I don't have the experience I will be affected when I'm learning online.

"At the beginning of the year, I was affected negatively because it was my first time using a laptop. But after like a few weeks I got used to everything and I was OK. Even now I'm good."

c. Previous schools (private schools) or model C

"Yes, I believe it does affect because if you come from rural areas and we think of the resources that they have and schools do not offer computer skills and stuff like that. So you are not exposed to technology as compared to children who come from urban schools."

"Yes for me it did because straight from primary school to high school we were offered to be taught about computer skills. How to use Word, Excel all the Microsoft Apps……"

"Yes, I do think it does influence the way you learn online. So in my case, I grew up in a well-established home and I went to a good school, I went to a private school. I was already learning online. Like for example how to use a laptop house, navigate Google and all those things and in my school, I did come computes applications technology matric. So I feel like that also gave me a better knowledge of digital technologies and everything. So in my opinion it did work well for me because I got to learn these things before I even came to varsity before I even went to matric. Because also in matric there was Covid so we

asked to use online learning. I feel like that already equipped me for the online learning that I got here at varsity."

"I agree that it influences how you learn online. For example, someone who grew up in an area where the schools would teach you how to learn with digital devices and taught you so that you could be proficient in using them? You'd have an upper hand when you have to come to university and have to use these devices, whereas if you went to a school within an impoverished kind of background you would have a much harder time because those schools wouldn't have access to the learners at these schools wouldn't have much access to digital devices in the same way that form model C schools would. I was affected positively. I would say I went to a formal Model C school where we had computer rooms with constant access to computers, computer teachers that would help us and guide us when using computers and we had to take Computer literacy classes, which I would say enhanced my digital skills."

d. The location where students stay I.e. good neighbourhood with a library.

"Yes, it does. In my neighbourhood, we did have a library and it had computers and at home, we had Wi-Fi at school as well we had computers and we did subjects that involved computers. So for my online learning, it makes things easier for me. I was able to not need the help of someone who navigates, especially when coming to, you know, university. I was able to easily grab somehow to use ulwazi."

Summary of the findings

Participants acknowledge that their social-economic background played a pivotal role in their online learning. Exposure to computers and laptops at a young age and primary school equipped them with computer skills. Also, living in a neighbourhood with a library fitted with computers assisted them with exposure and computer skills from an early age. However, coming from privileged backgrounds, they also acknowledge that students from rural areas might not have similar experiences. One participant from a disadvantaged background indicated that it negatively affected them as it was their first time exposed to computers and online learning.

Possible changes or improvements that can ensure a seamless online learning experience

The next section will discuss possible changes or improvements that can be incorporated to ensure a seamless online learning experience for students. The suggestions are organised according to sub-themes.

a. Digital Literacy

"I think it can be improved, by teaching students how to actually use and navigate our devices more effectively and also how to get other resources. Not being confined to one resource, I feel like we could have a lot of resources because I feel like. We having one resource kind of also makes it harder. Different resources like different schools would have textbooks on the phone. We would have apps that have lecture videos, you know, like different things where you can choose which one you want to listen to and which one works for you, which one doesn't because there are times where you find you might only be listening to your lecturer. You only have the lecturers and listen to, but you don't understand them...."

"I think the use of like other applications except for Microsoft Word because you find that sometimes in other courses just out of nowhere we have to use Excel and now we have to use Microsoft PowerPoint. I don't have a problem with it, but I do feel like it can be enhanced, especially for Excel".

"I would feel that everyone that comes to university has to do online learning would need to take an online proficiency class or any kind of digital skill proficiency class to improve their digital skills or have some kind of learning program that would help them learn skills to improve and be able to use these kinds of devices and platforms that we study on"

b. Government Initiatives

"I think the government should make it part of like a syllabus to make sure that students learn computer skills at school. If they are unable to learn at home."

c. University provided support

"...More support from the university like ulwazi learning online

....Follow-up on learners and encourage them to attend classes because it can get challenging sometimes.

Summary of the suggestions to improve online learning experience

Participants suggest teaching them how to use and navigate their devices and accessing learning resources. Additional suggestions were for different formats of learning resources due to no physical access to their instructors' other suggestions were for more training on using programs for creating and managing spreadsheets like Microsoft Excel as they are often required to use it. More guidance from the university on using the LMS (ulwazi), following up with students and encouragement on attending classes, as it can be challenging. Lastly, the government should ensure that computer skills become part of the curriculum from primary school learning, especially for learners who might not have access to digital technologies at home.

5.6.2 Social presence for online learning

Social presence focuses on how students interact with their instructors and other students while considering the context they are currently learning under, online learning in this instance. A context without physical contact, yet reliant on social media networks and other online facilities that can enforce interaction. The following discussion has been organised according to themes relating to social presence. The themes being addressed are "*Online communication, Social Context and Interactivity*"

a. student-instructor Interaction

"I'm in between, if I could say that like now, it's much better than it was the first semester. In the first semester I was kind of clueless and kind of alone but now that I'm used to lecturers and students in my course. It makes things much easier".

"No, I do not, so basically when I started school here varsity, I used to be one person that used to ask questions and everything.

".....As much as I use it that's on right now. I really can't ask because, I don't know the people around me in the class, you know, because obviously, we're using online learning, so I don't know the people around me in the class. And for example, for the big lectures like commercial law, there's like a lot of people in that class, and I feel like if I ask a question or if I say something."

“I honestly don't feel a sense of belonging. One I don't even feel comfortable speaking to my lecturers in class. And there's also that kind of disconnect between myself and my lecturer to the point where I don't even sometimes feel kind of scared to email them questions and concerns that I have. And I feel like that would have been so much easier if we had some sort of contact even to see my lecturer's face. Just it's difficult in the sense that I don’t even know whom I'm interacting with very well. Yeah, just creates some sort of anxiety for me.”

“No, not really, because we do not get to interact with our lectures and with the people in our classes.”

b. Student- Student Interaction

“No, I don't think so, we don't even talk to each other during lectures or tutorials, anything we don't communicate with each other. We don't even know each other”.

“I do, but not entirely. Because I feel like sometimes, we talk on the WhatsApp group but sometimes feel like I comment or ask a question and it won't be answered. People just ignore me. Whereas if it was face to face classes or face to face learning, I ask a question. I know that at least someone says, oh, I don't know. Or maybe ask that person they know. But when it's online I feel like with no communication”.

“I don't know, maybe it's going to seem as if I know I'm not as smart or I'm not doing my work, so I do believe that you know, I don't feel that sense of belonging because I don't know these people so I'm not comfortable to just say anything more to ask anything.”

“As much as they have tried with that, I still feel a bit isolated it’s kind of hard to click with them. I feel like if we were on campus and it was a larger group, it will be easier to make friends because you have a lot of people to choose from.”

“In the beginning, it was challenging thought I was going to fail because I was from a public school, we were using contact classes and I get here, and I was subjected to online learning. It was challenging and I was worried. Yeah, but I'm OK now.”

Follow-up: So, what do you think can be done to also improve the isolation?

"I say that as much as I had that at first, but I think they are trying to work on it. I'm not going to lie because if you live in res, but I mean for those that do not live in Res and other residents with you. We have like a program (RAA) Resident Academic Advisor will have students that are doing the same course in the same residence will meet up once a week and talk and stuff like that. That also does help knowing people that do the same course.

For me, that is also restrictive. It's not everywhere in like in the same group like I think there's like 14 or 15 in the group, and its hard finding friends in such a small group of people that you click with.

Summary of the findings relating to interactivity

Participants do not feel a sense of belonging, and they do not communicate with other students or their lecturers. They do not feel comfortable talking to their lecturers and feel disconnected to the point where it becomes difficult to ask questions or raise concerns they may have. They feel it would be easier seeing their lecturers' faces during an online class. Even with the WhatsApp group created to communicate, they still feel isolated. However, staying at the university residence provide a better experience, unlike students who are not on campus. Another participant indicated that it was challenging at the beginning of the year as a student from a public school used to contact learning and being exposed to online learning for the first time.

Interaction between students-instructors and student-student although physical contact is not available

The next section discusses the interactions participants experienced while there was no physical contact. The responses are organised according to sub-themes relating to interactivity

a. student-instructor interaction

"I feel like lecturers don't want to interact with us, they take time to answer our emails. Whenever you consult, they want you to email them your problems and then they email back like the feedback is not even, you know constructive or anything. For me, that has demotivated me to even ask, whenever you ask it's like you don't want to do it."

"Again, and not entirely, especially with their instructors. Because you find that you can send an email today and its urgent needs help today, but then the email will only be replied to two days later."

"Yes, I'm able, because I'm a class representative for my course so I kind of has to interact with my classmate and my lectures".

"With my instructors, no, I don't feel that comfortable, but I have to do, but it takes a lot of courage for me to email my lectures just because I just don't even feel like I know them."

"No, because now since you're not around them physically, you have the choice to not even answer them at all. If let's say your lecturer ask you a question, you can just pretend like you have some connection problem."

b. Student-Student Interaction

"All right, there are sometimes where I'm able to speak to my other classmates, for example in tutorials where we have to have discussions, we are able to interact and speak about the problem or whatever we are discussing."

"But obviously there's sometimes due to, like technical issues you can't hear the person, or the Wi-Fi is bad.... It destructs or it hinders the whole process of interacting with other classmates".

"And then with my classmates, because we have these group chats, it's kind of easier for us to interact with one another in the sense that you can ask questions about lecturers. It's much easier to interact with classmates because of the group chats that they've provided on WhatsApp."

Findings on online communication and social context

Lecturers take a long to respond to their emails even when they want to consult, which then demotivate them from asking questions. This could be a different experience with face-to-face interaction, asking a question on the spot and getting feedback immediately. Technical issues leading to not hearing the other person and unstable Wi-Fi hinders interaction with classmates. Also, they do not feel comfortable asking questions, as they feel like they do not know their lecturers. However, they can interact with their classmates on the created WhatsApp groups.

5.6.3 Digital competencies improving online learning

Digital competencies refer to the student's ability to engage confidently, critically and responsibly in an online environment. Including the ability to find information, communicate, collaborate, create content be safe online and be aware of intellectual property-related issues while engaging with content online. The following discussion relates to the digital competencies that are necessary to improve online learning experience. Participants were asked to elaborate on their digital competency experience.

Find Information

"They do. But not entirely because I sometimes struggle, especially when I have to find research for my tutorials such as psychology and uh, for sociology I sometimes struggle with finding content. Well, I think that can be improved, like in ways of how to navigate the Internet".

"…. Like for example how to use a laptop house, navigate Google and all those things and also in my school I did come computes applications technology matric. So, I feel like that also gave me a better knowledge of digital technologies and everything. So, in my opinion it did work well for me because I got to learn these things before, I even came to varsity before I even went to matric. Because also in matric there was Covid, so we asked to use online learning. I feel like that already equipped me for the online learning that I got here at varsity."

Summary of findings relating to digital technologies

Having had access to digital technologies at a young age does support their online learning. However, they could use more digital competencies to enhance their experience. For example, how to use research platforms such as Google Scholar and instructions on how to locate correct journal articles.

5.6.4 Digital skills improving online learning

Digital skills in this context refer to students' ability to locate content on the web, including content from the LMS as well as content for assignment writing purposes. Furthermore, their ability to use digital technologies to access content necessary for their learning. Participants were asked to elaborate on their digital skills that are necessary for their online learning experience. The discussion below focus on what participants can do relating to online learning. The responses are arranged according to sub-themes relating to digital skills - (locating content and navigating online).

a. *Overall digital skills experience*

i. Locate content

"Yes, I've always had devices so it's easy for me to look for things, find things, and you know unlike someone else as you said who might be from a rural area that does not have a phone. For them finding such things might be hard, but for me, it was never really a challenge."

ii. Navigating online

"Yes, I think so because if you struggle to find or navigate certain websites, certain apps … Because you are probably panicking because you can't submit on time. Not being able to find that work you need for assignment…"

Follow up: So, in your regard, you mean having the digital skills made easy to navigate online learning?

"Yes, "the devices that I use for online learning were devices that I really had prior to university. And as I said I'm in school I was able to see these things all able to learn how to use this and that, so in that, I believe that I was able to use those things in varsity. Although yes, there still are some things that obviously would not really be sure about in terms of like canvas (ulwazi)."

"OK, yeah they do enhance my learning because I know how to navigate through ulwazi and yeah."

"I do think that the digital skills that I have right now do you support my online learning in a sense that because I'm quite proficient with using technologies, I know how to access Internet platforms and how to

figure out how to use particular platforms quite easily. And because of background knowledge that I had from high school; it makes it easier for me to use programs like ulwazi that we have now."

"Yes, it does, if you're doing assignments and you have to navigate like Microsoft Word or Excel and some other courses are you don't struggle a lot."

b. *University preparing students with adequate digital skills for online learning*

i. Locate content

"Not entirely again. Yes, they did help. Umm, like with how to use a laptop and how to use ulwazi, but I still found it very confusing and again I feel like I needed help and a lot of guidance with using Google Scholar ..... But then when it came to Google Scholar, I struggle with finding the content, that I use it gave me something else. So, I think I need help with navigating".

ii. Digital Skills Training

"Yes, because at the beginning of the year everybody had to do an assignment where you have to type on Word, you have to do a form of Excel to check your digital skills.

"Yes, we did digital skills development, and we were taught about online quizzes. You also lend a hand in terms of helping students who were not able to navigate everything. So personally, I do believe that the university did play their part in ensuring that everyone you know is equipped to use online learning."

"I think because of the degree that I chose Law, they gave us a CLTD corpse and because of that, 'cause that kind of enhanced my digital skills. But not that much because it told us how to use Microsoft platforms only and not hard to navigate functionalities on the Internet, which I would obviously need for research."

"During the first week of school they did provide us with some videos like every all the courses they we had our in the modules section we had a whole section that taught us how to use ulwazi. What we do in as submitting assignments and everything else."

c. *Required digital skills needed to improve the online learning experience*

"I will need to learn how to use MS Excel, I don't know how to use excel. Also, how to start a meeting on MS Teams"

"Right now, I don't think there's anything else left. Whatever knowledge I have is enough for what is required from me".

"Personally, there is nothing for now that I find difficult"

"Yes, I feel like they did because they did have some webinars. They did have skills development; it's just skills development so obviously was up to the students to attend them or not. I do think that they did help if you did attend them. I think they did play their part and make sure they're you are aware of what's happening even in all in O-week."

"No, because I'm doing a course called ICT literacy. It's mandatory in my course so I'm OK."

"I'm not quite sure. I would feel that right now in this current year I had the right number of digital skills to progress and do my work. But then when it comes to researching like there was a platform called Google Scholar, I feel like those things like that could be explained more and how to find appropriate research platforms would be nice because as opposed to using sites like Wikipedia I don't know which sites I can actually use to find some journals, research journals and things of that sort.

d. *Overall experience with online learning*

a. Lecturers' Digital skills development

"It's in between because some lecturers can use some other technologies like MS Teams and ulwazi than others. I feel like on the university's side they could have been more prepared....

b. **Technical**

"The Wi-Fi issues can be improved. I believe it needs to be improved because I'm going to give an example. In my case, my laptop does not connect to all of the Wi-Fi networks and also sometimes it doesn't even connect, which then hinders me to learn because only the Wi-Fi is not working."

c. **Interactivity**

"...Some lecturers do not really respond so it's like there is no interaction between lecturers and students and you have queries you are supposed to like and also from the lecture, but it just seems to be like online learning has made it difficult for students to interact with lecturers privately, in a sense that if ever questioned and you ask the lecturer, some don't respond."

d. **Digital Skills Development**

"I don't think so. Uhm, when we came to university it was kind of like we just started like we came to university. There were no like courses that we did to help us with online learning at all. And there was one 'cause I think it was the first-year experience course which wasn't even compulsory, and it didn't touch on many things that I needed to progress like it didn't even teach us anything about ulwazi it didn't come Give us any necessary information that we need. We need to continue to work throughout the rest of the year."

e. **General**

"It has been good regarding assignments we are able to submit them faster and there's like less l paperwork involved"

Summary of the digital skills

Having had access to digital technologies that supported digital skills from a young age does support their online learning. However, they could use more digital skills to enhance their experience; specifically for research-related purposes. Some participants indicated the university did prepare students to a certain level in using platforms for online learning. However, more could still be done. The suggestion is that the digital skills program be made compulsories for all the students equipping them with adequate skills for their online experience. Additionally, to incorporate more programs into the digital skills, programs that will be useful for their learning such as Microsoft Excel, Microsoft Teams and journal articles searching sites. A necessity for training on the correct research related platforms to assist with completing research-related assignments.

Participants find online learning somewhat difficult. Improvement of the Wi-Fi as it often affects their online learning. Another issue is the interaction between lecturers and students, where they take longer or never respond to their emails. Participants also feel the digital skills training be improved as it did not provide them with the necessary skills they will need for the rest of the year.

Some of the lecturers did not know how to use some learning technologies, which the university could have adequately prepared them. Some lecturers may require more training using some online learning digital technologies. Participants prefer having their queries responded to in time, opposed to build-ups close to their assignments and exam. Some lecturers promise feedback, and they never provide it. It will be helpful if they have a 48-hour turnaround time to respond to their emails.

5.7 Summary of the chapter

This chapter provided an analysis of the collected quantitative and qualitative data. An online questionnaire was used to collect quantitative data to which a total number of 127 participants responded. The second part of the analysis consisted of qualitative data collected via a semi-structured interview that was administered via an online meeting tool. A total number of 7 participants took part in the research interview. The next chapter will focus on discussions.

6 DISCUSSIONS

6.1 Introduction

The previous chapter analysed the quantitative and qualitative data collected for the study. This chapter focused on interpreting the findings of the study against existing literature to determine the digital skills & competencies and social presence of online learning at a South African university. The discussion is conducted according to the identified themes from the framework.

6.2 Conclusions for the Themes

This section of the report will focus on the conclusion of the results based on the identified themes. Each theme is discussed in detail to indicate the findings from the study.

6.2.1 Social- Economic Background

The results from the study suggest that social-economic background does influence online learning. Evident with students who had access to digital technologies at a younger age. Some have exposure to computers and laptops from home and primary schools. Having computers at the library in their neighbourhood played a significant role in ensuring early exposure to technology. Furthermore, some participants' parents had trained them on using applications such as Microsoft Word from an early age. However, when drawing parallels with students who indicated that they did their high school education in rural areas, it is evident that there is a lack of technical, social, informational and epistemological competency. Therefore, indicating students' social-economic background plays a pivotal role in university student online learning.

Some participants indicated that they struggled with online learning at the beginning of the year due to no prior exposure and never having owned a computer or laptop before coming to the university. Evident from the results indicate that students who went to well-resourced schools and from privileged backgrounds do enjoy the benefits of online learning. The evidence is also supported by other scholars such as (Adedoyin & Soykan, 2020; Dube, 2020; Landa et al., 2021; Xie, Siau, & Nah, 2020).

6.2.2 Social context, online communication and Interactivity

From the results, it is evident that there is a level of isolation resultant from online learning. The use of social media networks such as WhatsApp is incorporated to try and eliminate students not experiencing social presence. Notably, some participants still prefer physical contact to cultivate a sense of belonging, as expressed when relaying the issue of delayed email feedback from instructors. As opposed to if it were face-to-face, they would receive immediate feedback. The university introducing an advisory program at the residence level also assisted to some degree a sense of social presence. Participants were grouped into 15 with peers from the same course, which improved their student-student interaction. Lastly, effective use of social media networks can promote interaction, potentially leading to a social presence in an online learning environment.

The results are supported by what Xie et al. (2020); Munoz et al. (2021) have stated in connection with learners feeling isolated and separated from their instructors and other students. Contact classes or physical campuses creates opportunities for collaboration and friendship, potentially leading to students feeling a sense of belonging. The presence of the Covid-19 pandemic has increased the lack of contact or physical interaction (Munoz et al., 2021; Xie et al., 2020).

6.2.3 GTCU Competencies (*Technical, Social, Informational and Epistemological*)

The GTCU competencies were used to explore participants' technical, social, informational and epistemological competencies to indicate their digital skills and digital competencies. The study results indicate that majority of the participants possess somewhat of the digital skills and digital competencies needed for online learning. It should be noted, those skills have been acquired before joining the university. However, students from previously disadvantaged backgrounds seem to lack those digital skills and digital competencies, which may affect how they learn online. There is a need for improving digital skills and digital competencies among university students so they can fully exploit the possibilities and benefits of online learning. Skills such as searching journals for essay writing purposes are vital for their assessments.

Participants indicated a need for university students to develop digital skills and digital competencies. The development should begin from early childhood development, so by the time they reach the university learning space, they are competent in using digital technologies so their learning will not be affected. Participants also indicated that digital skills and competency training should not be conducted online. Challenges such as connectivity and not engaging face-to-face will make it harder.

One of the responses from the results indicated that instructors need to improve their digital skills and their digital competency. Xie et al. (2020); Landa et al. (2021); (Munoz et al., 2021) also, indicated that a lot of instructors and students had little to no training or experience with online learning. This challenge has been more prevalent during the pandemic.

The results also suggested that the government should introduce digital skills and digital competency developmental programs, starting from an early age. The notion of government involvement is also suggested by (Dube, 2020). Furthermore, the government needs to ensure that online learning becomes a viable reality (Dube, 2020; Landa et al., 2021).

6.3 Recommendations

This section explores recommendations from the study.

The following activities should be considered to improve university online learning.

6.3.1 Technical Competency

- A stable internet connection, and an increased internet data bundle allocation for off-campus use.
- Students learn more about digital technologies and how to use them effectively.
- The government incorporated digital skills and digital competencies into the curriculum as early as primary school education.

Dube (2020) also support that the price of data should be reduced or the Department of education can provide free access to learning materials that will ensure equal access to all students. Adedoyin and Soykan (2020) further recommended that educational institutions can collaborate with telecommunication industries to subsidize the high costs of data or provide free internet to students and instructors as part of their corporate social responsibilities. Lastly, Adedoyin and Soykan (2020) suggested that digital skills can be embedded in every subject instead of designing a separate program.

6.3.2 Epistemological Competency

- Students indicate that they will appreciate different resource types, such as videos that explain the work rather than just reading.
- Reduced workload and timely feedback and patience while students adjust to online learning. Students feel some of the comments they received from their feedback were harsh and demotivating.
- Personalised learning tailored from an individual's intellectual capacity and personal circumstances.

Stevens, Stevens and Grady (2021) presented a low-cost 3D printed mirror mount with a mirror attached that can be used on a laptop which enables student-student collaboration. Furthermore, it provides instructors with an opportunity to see and interact with student work in real-time while they are still holding offices hours in remote locations (Stevens et al., 2021). The ability to meet with remote students in real-time provide instructors with an opportunity to provide timely feedback. Firat and Bozkurt (2020) suggested that instructional designers should do away with the one-size-fits-all approach and adopt individualized learning opportunities to cater to different students' learning needs. This can be done using adaptive learning systems(Firat & Bozkurt, 2020). Adedoyin and Soykan (2020) recommended that instructors' research should be geared towards the development of a uniform online learning model that can be applied to all disciplines.

6.3.3 Interactivity

- Live lecturers will allow asynchronous learning, and students directly interact with their instructors and fellow students. Live lecturers will then encourage student participation.
- Create smaller groups within courses and coordinate social events that will improve better and more personal interactions. Cultivating more opportunities for online meetings among instructors and peers.

The 3D printed mirrors simulate asynchronous learning, students can ask questions from the instructors and get feedback in real-time unlike when they have to wait for email feedback(Stevens, Stevens, & Grady, 2021). The 3D printed mirror mount enables student-student interaction and group collaboration (Stevens et al., 2021). Students were able to work in groups even in a case where one of the students might be in quarantine due to a positive Covid-19 infection(Stevens et al., 2021).

6.4 Summary of the chapter

This chapter focused on the study findings and recommendations. This was done by analysing each theme of the study and how the discussion answered the research questions. The next chapter will focus on the conclusions and suggestions for future research.

7 CONCLUSION

7.1 Introduction

The previous chapter focused on the discussions and recommendations of the study. This chapter discusses the contributions the study made to the body of knowledge and conclusions.

7.2 Overview of the chapters

The first chapter of the report provided the background to the study, done by providing the key concepts that make up the study. The rationale was to provide a context and the background to the study area for readers to have common knowledge about the research report. That was followed by the problem statement, purpose and goal of the study, the study objectives, research questions, knowledge gap and the delimitations of the study.

The research gap identified were the digital skills, digital competencies and social presence impacting South African university online learning. With the main aim of answering the question of; “What digital skills, digital competencies and social presence are necessary for an effective South African university online learning”? The study was conducted with the objective to determine how digital skills, digital competencies and social presence impact South African university online learning

The second chapter provided the literature review, providing more detail to the previous studies on the research area. The key concepts discussed were online learning, social presence, social-economic background and learning theories. The aim was to investigate what the previous research discovered. The study subscribed to the constructivism learning theory.

The third chapter focused on the theoretical underpinnings of the study, identifying the concepts that make up the study. A conceptual research framework was developed using the General Technology Competency and Use (GTCU) framework and the Social Presence theory to understand digital skills and digital competencies necessary for university students’ online learning. The conceptual research framework was also discussed, and the elements that made up the framework were. The following concepts we engaged with were technical competency, social

competency, informational competency, epistemological competency, social context, online communication and interactivity.

The research methodology followed to answer the research questions was discussed in Chapter 4. The study followed the interpretivism paradigm subscribing to the abduction research approach. The mixed-method research design was used to answer the identified research questions using a case study. The study used a single case whereby the University of Witwatersrand First-Year students staying the university residents was the focus. The data was collected using both quantitative (online questionnaire) and qualitative (interviews and observations). The quantitative results were analysed using descriptive, while thematic analysis was used to analyse the qualitative results. The rigour of the research was also discussed, together with the ethical consideration.

Chapter 5 of the study discussed the findings of both the quantitative and the qualitative data. A total number of 127 took part in the online questionnaire. Based on the GTCU framework using the different competencies (Technical, Social, Information and Epistemological), some participants faced challenges using certain digital technologies that could impact their online learning. The open-ended question on the online questionnaire revealed that participants require a stable internet connection, access to loan devices timely and further data allocation from what the university is already providing. Participants also indicated that they would appreciate more interaction with the instructors and students, live sessions that will encourage participation. They also indicated patience from instructors would be appreciated as online learning is a new phenomenon for them. Furthermore, the language used with feedback could be less harsh as it often demotivates them. Lastly, participants suggested that instructors discover online learning suitable for students in reflection and practice.

The semi-structured interviews conducted revealed that the participants engaged were predominantly from urban areas and not from rural areas hence their views were of students who had access to technology from home throughout their primary and secondary schooling. Some had access to libraries in the neighbourhood which provided access to digital technologies. Lastly, their parents are identified as the middle class who are also technologically knowledgeable,

providing them access to digital devices and teaching them how to use them. Thus, giving these students more advantages in accessing online learning at the university level.

Chapter 6 focused on the discussions of the study results, indicating that social-economic background plays a pivotal role in students' progress with post-matric education. Students who came from well off families had early access to digital technologies. They were taught how to use a computer and certain computer applications. They also went to the good schools where they used digital technologies and online learning, which ensured little to no struggle with adjusting to online learning provided at the university. Students who had no prior knowledge of online learning struggled at the beginning of the year. Similar views are held by some scholars in that those students from disadvantaged backgrounds do not fully enjoy the benefits of online learning (Adedoyin & Soykan, 2020; Adnan & Anwar, 2020; Bozkurt et al., 2020; Dube, 2020).

Participants also indicated that they feel isolated as a result of online learning, inability to easily interact with their classmates and instructors. Some have established some social presence by relying on social media such as WhatsApp. However, they only have access to their classmates and not their lecturers. They also revealed that the turnaround time of instructors' feedback is too long, contact classes would be preferable. Additionally, they would make better friendships if they engaged with their classmates in person. Some scholars also indicated that students often feel isolated from their peers and instructors, exacerbated by the global pandemic (Munoz et al., 2021; Xie et al., 2020).

7.3 Summary of how each research question was answered

7.3.1 Primary research question

What digital skills, digital competencies and social presence are necessary to improve South African university online learning?

The findings indicate that participants having digital skills and digital competencies did improve their university online learning. Participants familiar with social media such as WhatsApp, one of the digital skills and digital competencies for communication, have improved social presence. With the pandemic requiring no physical contact, they built online communities and thus improve online learning engagement. Thus, indicating that effective use of social media positively impacts social presence in an online learning environment.

7.3.2 Secondary Research question

- *What influence does social-economic background have on online learning?*

Findings indicate that social-economic background does influence online learning. Students who came from privileged backgrounds were exposed to computers at an early age. They were also taught by their family members how to use computers and other applications such as word processing. Some were exposed to computers at libraries in their neighbourhood. Additionally, some used computers in primary to secondary education as well as online learning before joining the university.

- *What influence does social presence have on university online learning?*

Social media was used to improve interaction and a sense of belonging did enable university online learning. participants were able to form communities using social media such as WhatsApp to interact with their classmates as a result they build communities. The findings demonstrate that social presence enables university online learning, continuous effective use of

communication tools have an immense impact on how student learn online and relate with other students.

- *What influence does digital skills and digital competencies have on university online learning?*

Participants exposed to digital skills and digital competencies at home and pre-university improved their online learning experience as university students. Having used online learning in high school made their experience better, enjoying the benefits provided by online learning. Some participants need more training on programs such as MS Excel, which they use extensively in their studies, thus indicating that having digital skills and digital competencies can improve their online learning. Some indicated that knowing how to use websites such as Google Scholar, which is instrumental for research needed for their courses, will improve their online learning experience. Lastly, familiarity with web conferencing tools such as MS Teams will add value and improve their online learning.

7.4 Study Contributions

7.4.1 Theoretical contribution

The study contributed theoretically on how digital skills and competencies can improve South African university online learning and how social presence is attainable while students are engaged in fully online learning. Higher learning institutes conducting online learning can incorporate the framework. Additionally, the framework will assist institutions of higher learning that are implementing online learning by ensuring that students have the necessary digital skills and competencies and how social presence can be experienced in a fully online learning environment. It will help improve current digital skills and digital competencies development offerings.

7.4.2 Practical contribution

The practical contributions of the study are how digital skills and digital competencies development programs can be designed to ensure students enjoy the benefits of online learning. The digital skills program can be conducted face-to-face where it is safe to do so. It is also evident that student performance in an online learning environment is directly related to their social-economic background. Policies such as the NDP 2030 can guide how the digital literacy gaps can be filled in previously disadvantaged communities. Improved Wi-Fi offerings are to be managed by University ICT management; poor connections may negatively affect online learning. Increased data allocation accommodates students' online learning while off-campus. Furthermore, stakeholders responsible for loan device rollout can provide these during the registration period. Thus, ensuring that students have a laptop before learning commences. Additionally, professional developments aimed at lecturers can also see how they improve on their training offerings that focus on student engagement, thus resulting in students' improved sense of belonging. Lastly, Student Affairs can improve initiatives aimed at the social well-being of the students with a focus on interaction improvement.

7.4.3 Methodological contribution

The literature review process identified knowledge gaps in the research methodology. Prior research used survey method on assessing students' experiences (He & Zhao, 2020; Jiménez-Cortés, Vico-Bosch, & Rebollo-Catalán, 2017; Zhao et al., 2021). Therefore, the methodological contribution of this study is the use of an exploratory case following an interpretivist research paradigm. Additionally, data collection used three methods namely, an online questionnaire, observations and semi-structured interviews. Prior research only made use of surveys or interviews separately. Semi-structured interviews provided a deeper insight into the students' experience of digital skills, digital competencies and social presence.

7.5 Study Limitations

The use of GTCU a Canadian-based framework, Canada being a highly developed mixed-market economy and being applied to the University of the Witwatersrand in South Africa a developing country. Study participants volunteered to take part with no incentives offered to them. Some participants could not [immediately] participate during the examination period, and participation occurred via emails. The study was conducted during the COVID-19 lockdown regulations, limiting interview methods. Most of the study participants were from an advantaged background, which may not be the reality for students from a previously disadvantaged background. The study was also conducted in Johannesburg, with university residence students having access to better facilities when compared to students who might be at home. It would be interesting to hear the views of those students. Lastly, the possibility that disadvantaged students were not reachable during the data collection process exists, which could be due to lack of internet access, continued electricity outages in the country, network issues or access to emails.

7.6 Suggestions for Future research

The following suggestions could be considered for future research:

Future research should focus on the impact of digital skills and digital competencies on students' performance using online learning. Draw parallels on the online learning experience between on-campus and off-campus students. What could be the impact of digital skills and digital competency on graduate employability? Other research can focus on university lecturers and their digital skills and digital competency during a pandemic. What is the impact of Covid-19 and online learning on mental health and performance for both students and lecturers? Lastly, the future of university learning posts the global pandemic of Covid-19.

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8 APPENDIXES ETHICS CLEARANCE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Lubisi

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H20/08/14**
PROJECT TITLE	A framework for South African university students online learning: social presence, digital skills and competencies
INVESTIGATOR(S)	Miss N Lubisi
SCHOOL/DEPARTMENT	Business Sciences/
DATE CONSIDERED	21 August 2020
DECISION OF THE COMMITTEE	Approved Risk Level: Low
EXPIRY DATE	18 October 2023

DATE 19 October 2020 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Professor R Kekwaletswe and Dr S Mwapwele

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. **I agree to completion of a regular progress report. For Minimal and Low studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.**

Ntombizethu Lubisi Digitally signed by Ntombizethu Lubisi Date: 2021.09.22 14:59:46 +02'00'

Signature

22 / 09 / 2021
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

8.1 Appendix B: Permission Letter

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

OFFICE OF THE DEPUTY REGISTRAR

23 September 2021

Nthombizethu Lubisi
Student Number (1710532)
Master of Commerce Information Systems
Faculty of Commerce, Law & Management

TO WHOM IT MAY CONCERN

"A framework for South African university students online learning: social presence, digital skills and competencies."

This letter serves to confirm that the above project has received permission for research to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

Ethical clearance has been obtained. (Protocol number: H20/08/14)

Research Expiration: (18 October 2023)

Nicoleen Potgieter
University Deputy Registrar

cc Professor R Kekwaletswe and Dr S Mwapwele

8.2 Appendix C Participant Information Letter: Interview



Ethics Protocol Number: H20/08/14

Dear Sir/Madam

My name is Ntombizethu Lubisi and I am a Masters student in Information Systems at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating the use of a Learning Management System for online learning under the supervision of Dr Samwel Mwapwele and Prof Ray Kekwaletswe. The topic of my study is "***A framework for South African university students' online learning: social presence, digital skills and competencies***". This research project aims to conceptualize a framework for digital skills and digital competencies for South African university online learning.

As part of this project, I would like to invite you to take part in an interview. This activity will involve a series of questions and will take around 40-60 minutes. With your permission, I would also like to record the interview using a digital device. Due to the lockdown regulations, interviews will be conducted via MS Teams.

There will be no personal costs to you if you participate in this project, You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any questions if you do not want to. The interview will be completely confidential, the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,
Ntombizethu Patricia Lubisi

Researcher:
Ntombizethu Patricia Lubisi, [redacted]

8.3 Appendix D Participant Information Letter: Questionnaire



Dear Sir / Madam,

My name is Ntombizethu Lubisi and I am a Masters student in Information Systems at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating the use of a Learning Management System for online learning under the supervision of Dr Samwel Mwapwele and Prof Ray Kekwaletswe. The topic of my study is "***A framework for South African university students' online learning: social presence, digital skills and competencies***". This research project aims to conceptualize a framework for digital skills and digital competencies for South African university online learning.

As part of this project, I would like to invite you to take part in a questionnaire. The online questionnaire will take approximately 40 minutes to complete. A link using Qualtrics to the questionnaire will be sent through the SIMS emailing system. Confidentiality and anonymity of participants will be maintained as the questionnaire does not ask for any identifiable information like names or personal details. Participation is entirely voluntary, hence choosing to proceed to and completion of the survey will be considered as consent to participate.

There will be no personal costs to you if you participate in this project, You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any questions if you do not want to. The questionnaire will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,
Ntombizethu Patricia Lubisi

Researcher:
Ntombizethu Patricia Lubisi, [redacted]

8.4 Appendix E Participation Consent



A framework for South African university students' online learning: social presence, digital skills and competencies

Ntombizethu Lubisi (1710532)

I, ..., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous	YES NO
I agree that the researcher may use anonymous quotes in his / her research report	YES NO
I agree that the interview may be audio recorded	YES NO
I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES NO

..... (signature)
..... (name of participant)
..... (date)

..... (signature)
Ntombizethu Lubisi (name of person seeking consent)
..... (date)

8.5 Appendix F Online Questionnaire



A framework for South African university students' online learning: social presence, digital skills and competencies

Dear participants my name is Ntombizethu Lubisi and I am a Masters student in Information systems at the University of Witwatersrand. As part of my studies, I must conduct a research project alongside my supervisors, Dr Samwel Mwapwele and Prof Ray Kekwaletswe. I would like to invite you to kindly participate in an anonymous survey as part of my research study titled: **"A framework for South African university students' online learning: social presence, digital skills and competencies"**

The online questionnaire takes approximately 45 minutes to complete. Confidentiality and anonymity of participants are maintained as the survey does not ask for any identifiable information like names or personal details. Participation is entirely voluntary, hence choosing to proceed to and completion of the survey will be considered as consent to participate. By clicking next

Note that this evaluation is subjective in nature and there is no "right" or "wrong" answer. Your corporation is highly appreciated.

Consent Statement

The questionnaire is divided into four sections and should take approximately 40 minutes to complete.
I agree with and understand the following:

1. My responses will be used solely for education and academic research.
2. My privacy and confidentiality will be respected. No personally identifiable information will be shared on the questionnaire or report.
3. My participation in the survey is solely voluntary.
4. It is my right to withdraw from the survey at any given stage.

Consent

Please click the following circle if you have read and agree with the statements given above.

○ I confirm that I have read the above statements

DEMOGRAPHIC

1. Age?

- ○ Under 15
- ○ 15 - 18
- ○ 19 - 22
- ○ 23 - 26
- ○ 27 - 30
- ○ Above 30

---

2. Gender?

- ○ Male
- ○ Female
- ○ Non-binary/third gender
- ○ Prefer not to say

---

3. Which best describe the area where you did your high school?

- ○ Urban
- ○ Peri-urban
- ○ Rural
- ○ Remote
- ○ Not sure/ Don't remember

4. **Faculty?**

- ○ Commerce, Law and Management
- ○ Engineering and the Built Environment
- ○ Health Science
- ○ Humanities
- ○ Science
- ○ Other _____

ACCESS & DIGITAL TECHNOLOGIES

5. **Have you ever been exposed to online learning before?**

- ○ Yes
- ○ No

6. **If yes, where was it?**

- ☐ High School
- ☐ College
- ☐ Another university
- ☐ Personal training/development
- ☐ Other _____

7. How do you access online learning?

- [ ] Desktop
- [ ] Tablet
- [ ] Smartphone
- [ ] Other _____

---

8. Which Internet Service Provider do you use to access online learning?

- [ ] MTN
- [ ] Telkom
- [ ] Rain
- [ ] Vodacom
- [ ] Other _____

GENERAL TECHNOLOGY COMPETENCY AND USE (GTCU)

9. **Reflect on your most recent online course experiences then indicate the extent to with you agree with the following statements.** *(Technical Competency)*

	Not knowledgeable at all	Slightly knowledgeable	Moderately knowledgeable	Very knowledgeable	Extremely knowledgeable
I have learned how to create/edit electronic documents (word processing, presentations, spreadsheets)	○	○	○	○	○
I learned how to create/edit audio recordings (podcasts, voice memos)	○	○	○	○	○
I learned how to create/edit multimedia items (photographs, movies, slideshows)	○	○	○	○	○
I learned how to manage any of my accounts (email, bank, phone, video chat service, TV/movie service, etc.)	○	○	○	○	○
I learned how to manage or operate other devices (home entertainment system, thermostats, lights, etc.)	○	○	○	○	○

10. **Reflect on your most recent online course experiences then indicate the extent to with you agree with the following statements.** *(Social Competency)*

	Not challenging at all	Slightly challenging	Moderately challenging	Very challenging	Extremely challenging
I can communicate with others using text chat or text messaging (SMS, etc.)	○	○	○	○	○
I can communicate with others using audio (WhatsApp, phone)	○	○	○	○	○
I can communicate with others using video (FaceTime, WhatsApp)	○	○	○	○	○
I can communicate using e-mail.	○	○	○	○	○
I can use social networking systems (Facebook, Instagram, LinkedIn, Twitter, etc.)	○	○	○	○	○
I can use collaboration/shared document tools (Google Drive, Dropbox, etc.)	○	○	○	○	○
I can share my works and ideas publicly (blogs [WordPress], photo sharing [Flickr, Picasa], Pinterest, etc.)	○	○	○	○	○

11. **Reflect on your most recent online course experiences then indicate the extent to with you agree with the following statements.** (*Informational Competency*)

	Not knowledgeable at all	Slightly knowledgeable	Moderately knowledgeable	Very knowledgeable	Extremely knowledgeable
I can access digital maps (MapQuest, Google Maps) or a GPS (TomTom, Garmin, etc.)	○	○	○	○	○
I can search for journal articles online.	○	○	○	○	○
I can search for short videos (YouTube) on the Internet.	○	○	○	○	○
I can search for/download movies.	○	○	○	○	○
I can search for/download music.	○	○	○	○	○
I can search for/download electronic books.	○	○	○	○	○
I can use an aggregator to automatically collect and organize documents (news aggregators, RSS feeds etc.).	○	○	○	○	○

12. Reflect on your most recent online course experiences then indicate the extent to with you agree with the following statements. *(Epistemological Competency)*

	Not knowledgeable at all	Slightly knowledgeable	Moderately knowledgeable	Very knowledgeable	Extremely knowledgeable
I can use/share a calendar/personal agenda.	○	○	○	○	○
I can create/use concept maps or flowcharts	○	○	○	○	○
I can create/modify/use plans or diagrams.	○	○	○	○	○
I can sort large amounts of data.	○	○	○	○	○
I can create graphs from numerical data.	○	○	○	○	○
I can do complex calculations.	○	○	○	○	○
I can do programming.	○	○	○	○	○

SOCIAL PRESENCE

13. **Reflect on your most recent online course experiences then indicate the extent to with you agree with the following statements.** *(Online Communication & Social Context)*

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Communication in the courses was impersonal	○	○	○	○	○
I feel comfortable conversing in the courses	○	○	○	○	○
I feel comfortable introducing myself in the courses	○	○	○	○	○
The course introductions enabled me to form a sense of the community	○	○	○	○	○
I felt comfortable participating in course discussions	○	○	○	○	○
The instructor-facilitated discussion in the course	○	○	○	○	○
I felt that my point of view was acknowledged by other participants in the courses	○	○	○	○	○
I was able to form distinct impressions of some students in the courses	○	○	○	○	○

SOCIAL INTERACTION

14. Reflect on your most recent course experiences then indicate the extent to with you agree with the following statements. *(Interactivity)*

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Courses are an excellent means for social interaction	○	○	○	○	○
I felt comfortable interacting with other students in the courses	○	○	○	○	○
The amount of interaction with other students in the courses was appropriate	○	○	○	○	○
The quality of interaction with other students in the courses was appropriate	○	○	○	○	○
The amount of interaction with the instructor in the courses was appropriate.	○	○	○	○	○
The quality of interaction with the instructor in the courses was appropriate.	○	○	○	○	○

15. Suggestions that can improve my online learning

8.6 Appendix G Interview Questions



Research interview Questions

Dear participants my name is Ntombizethu Lubisi and I am a Masters student in Information System at the University of Witwatersrand. As part of my studies, I must conduct a research project alongside my supervisor, Prof Ray Kekwaletswe. I would like to invite you to kindly participate in an anonymous survey as part of my research study titled: "**A framework for digital skills and competencies for South African university online learning**"

The interview will take approximately 40-60 minutes to complete. The interview will be completely confidential, the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time. Participation is entirely voluntary, hence choosing to proceed to and completion of the interview will be considered as consent to participate.

Digital skills are "the user's ability to locate content on the web effectively and efficiently" (Hargittai, 2005, p. 372). Furthermore, it can be seen "as a range of abilities to use digital devices, communication applications, and networks to access and manage information" (UNESCO, 2018)

"Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competencies related to cybersecurity), intellectual property related questions, problem-solving and critical thinking" (The Council of the European Union, 2018, p. 9)

Note that this evaluation is subjective in nature and there is no "right" or "wrong" answer. Your Corporation is highly appreciated.

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THEME 1: SOCIAL-ECONOMIC BACKGROUND INFLUENCE ON ONLINE LEARNING

1. Does your social-economic background influence how you learn online? elaborate

2. What can be changed or improved to ensure a seamless online learning experience?

THEME 2: SOCIAL PRESENCE FOR ONLINE LEARNING

3. With learning moved online do you feel the sense of being and belonging to your current course? Elaborate.

4. Are you able to interact well with your classmates and instructor although physical contact not available? Elaborate.

THEME 3: DIGITAL SKILLS AND DIGITAL COMPETENCIES IMPROVING ONLINE LEARNING

5. Do you think the digital skills and competencies you possess support your online learning? Elaborate