EXPLORING THE ROLE OF WEB 2.0 APPLICATIONS IN THE ACQUISITION OF DIGITAL LITERACY BY FIRST-YEAR STUDENTS AT A SOUTH AFRICAN UNIVERSITY OF TECHNOLOGY

BY

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Declaration

I acknowledge that the dissertation above is my original work, and that plagiarism is unethical. Also, presenting someone else's work as one's own is another aspect of plagiarism. That is why I have appropriately acknowledged all sources I used or quoted by providing comprehensive references. In writing this thesis, I have adhered to the citation and referencing guidelines of the Harvard University of Cape Town. I can confirm that the dissertation meets the specified requirements for originality after running it using originality plagiarism checking software called Turnitin. Additionally, plagiarism involves submitting someone else's work as I confirm that this work, or any part of it, has not previously been reviewed at UCT for another qualification or at any other higher education institution. Finally, this thesis is my original work, and I have not permitted or will not allow anyone to copy it with the intention of passing it off as their own.

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Abstract

Despite the growing use of digital technologies in higher education, particularly in the university of technology (UoT) under investigation, many first-year students find it challenging to actively engage with online learning because of a lack of competence in digital literacy. This suggests that developing digital literacy is becoming more important for higher education students' success. This study adopted a skills-based approach, recognizing the core technical and information literacy practices and skills students need to effectively carry out their learning activities across their courses and beyond. The aim of this study was to explore the utilisation of Web 2.0 applications to facilitate the development of digital literacies among first-year Engineering students at a UoT. These applications include many different social media applications and websites, including blogs, discussion forums, wikis, social media networks and social bookmarking.

A sequential mixed-methods strategy was adopted in this study to collect both pre-course (quantitative) and post-course (qualitative) data from a purposive sample of 275 first-year Engineering students. The pre-course questionnaire solicited data on students' lack of digital literacy to establish their digital literacy training needs. Over the course of two weeks, a digital literacy course was delivered with the goal of supporting students with navigating the transition between high school and university. After that, three focus groups were held with 27 students to explore the skills developed and their perceptions about the usage of Web 2.0 apps in facilitating their digital literacy acquisition. The pre- and post-course questions were developed using Ng's concepts and the three dimensions of digital literacy (technical, cognitive, and social-emotional). The intricate dimensions of student digital literacy were further analysed using Ng's framework. Additionally, the framework for digital literacy developed by Martin was used to explain how students' digital literacy developed as a result of their usage and competence with technology.

Significant findings are that YouTube played a pivotal role in facilitating students' development of digital literacy. In comparison, discussion forums and blogs were not effective because students were uncomfortable posting or commenting in English, (the medium of instruction) and not their native language. Also, students felt that the duration of the digital literacy course was too short. The results of this study could inform attempts to enhance students' abilities to succeed in digital learning, including curriculum development, pedagogical approaches, and digital literacy programmes. It is recommended that: (i) the digital literacy course be extended over a longer period; and (ii) educators integrate digital literacy into the curriculum with the goal to support students from disadvantaged backgrounds who lack basic digital literacy.

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List of Acronyms and Abbreviations

BB	Blackboard
BUSSE	Beginning University Survey of Student Engagement
CAT	Computer Applications Technology
FYE	First-Year Experience
HEI	Higher Education Institutions
HE	Higher Education
ICT	Information and Communication Technology
IM	Instant messaging
IS	Information Systems
LMS	Learning Management System
MOOC	Massive Open Online Courses
MS	Microsoft
MUT	Mangosuthu University of Technology
NSFAS	National Student Financial Aid Scheme
OER	Open Educational Resources
PC	Personal Computer
SPSS	Statistical Package for Social Sciences
TLDC	Teaching and Learning Development Centre
UCT	University of Cape Town
UoT	University of Technology
Wi-Fi	Wireless Fidelity

CHAPTER 1: INTRODUCTION

1.1 Introduction

Digital literacy continues to grow prominence in the realm of education and is recognised as a key competence in higher education (Chan, Churchill & Chiu, 2017; Zulkarnain, Heleni & Thahir, 2020). That is, students need to cultivate the ability to interact with information, think critically, collaborate, and communicate in digital environments (Gutiérrez-Ángel et al., 2022; Istifci & Goksel, 2022). However, challenges related to academic and digital literacy persist among university students, particularly in South Africa, including those at the University of Technology (UoT) under investigation (Cam & Kiyici, 2017; Mbunge, Fashoto & Olaomi, 2021; Techataweewan & Prasertsin, 2018; Zulkarnain, Heleni & Thahir, 2020). Recognising the importance of addressing these challenges, this study explored the role of Web 2.0 applications in bridging the digital literacy gaps among first-year students at the UoT. Ng's digital literacy framework (with the technical, cognitive and social-emotional dimensions) was utilised to define the various dimension of digital literacy, while Martin's (2008) framework (with digital competence, usage and transformation) was used to evaluate students' advancements in acquiring digital literacy. This study's objective is to contribute valuable insights that can guide the development of first-year students' digital literacy at UoT and similar context.

1.2 Problem Statement

Several students entering universities in South Africa, including the UoT under investigation, have limited exposure to computing and therefore lack fundamental computer skills (Naidoo & Raju, 2012). These students are frequently identified as "underprepared" because they lack crucial digital literacy required for learning in their disciplines (Jaffer, Ng'ambi & Czerniewicz, 2007; Naidoo & Raju, 2012; Timmis et al., 2019; Martzoukou et al., 2020; Faloye & Ajayi, 2022;).

The challenge of underdeveloped digital literacy became increasingly evident during the COVID-19 pandemic, especially among first-year university students who had to heavily rely on emerging technologies for learning during the shift to online education (Omodan, 2020). Boughey and McKenna (2022) also found in their study that this challenge was exposed by the shift to online learning, emphasising the crucial role of digital literacy in effectively navigating the educational landscape. This challenge was particularly evident among the UoT students from low socioeconomic backgrounds, whereby the university utilised the Beginning

University Survey of Student Engagement[1] (BUSSE) in 2021 and 2022 to identify first-year students' areas for improvement. The BUSSE data revealed a significant lack of computer skills (i.e., technical dimension) among first-year students, which are crucial for effective engagement in digital learning environments. Therefore, the questionnaire was used to elicit more information on the cognitive and social-emotional dimensions of digital literacy.

Studies emphasise the beneficial effects of Web 2.0 apps, such as WhatsApp and TikTok, to improve collaborative learning, communication, creativity, and digital literacy among students (Basitere & Mapatagane, 2018; Udenze & Oshionebo, 2020; Jerasa & Boffone, 2021; Mulyana & Anggraini, 2021). The integration of these widely used platforms into higher education offers a means to connect students' everyday digital practices with academic learning. Notably, students are already proficient in using platforms like WhatsApp and TikTok for personal purposes, making them integral aspects of daily life (Hargittai, 2021; Jena et al., 2020; Livingstone & Third, 2017). Leveraging these familiar tools in educational contexts provides an opportunity to enhance digital literacy by tapping into students' existing engagement with digital technologies.

Practitioners, educators, and researchers (Chen & Bryer, 2012; Tsvetkova et al., 2021) have purposefully used social media and Twitter to teach digital literacy to first-year students who lack cognitive, technical, and social-emotional skills at a university. Elsewhere, Web 2.0 applications provided students with unique opportunities to actively interact with digital content, generate and disseminate information, and collaborate with their peers, thereby nurturing an interactive and participatory learning environment (Tsvetkova et al., 2021). Several studies have explored into the importance of utilising Web 2.0 applications for student engagement and learning outcomes (Chen & Bryer, 2012; Chugh et al., 2019), the influence of digital literacy on academic performance (Sonmez & Cakir, 2021), and the correlation between Engineering students' digital literacy skill level and their socio-cultural backgrounds (Hatlevik et al., 2018).

[1] The Beginning University Survey of Student Engagement (BUSSE) is administered by the University of the Free State. It measures entering first-year students' pre-university experiences and their expectations regarding participation in educationally purposeful activities during their first year of study. BUSSE is administered as soon as students arrive on campus and the data is available within eight weeks.

Therefore, additional research is necessary to ascertain how these applications could potentially facilitate the development of digital literacy in South African UoTs, particularly in resource-constrained contexts and first-year students with poor socioeconomic backgrounds (Jimoyiannis et al., 2013; Tang & Chaw, 2016). The aim of this study was to explore the role of Web 2.0 applications to facilitate the development of digital literacy among first-year students at the UoT, with specific attention to the South African context.

1.3. Research objectives and question

What is the role of Web 2.0 applications in the acquisition of digital literacy by first-year students at a South African UoT?

Research objectives

Given the various opportunities that are afforded through the use of Web 2.0 applications as teaching tools, the objectives of the proposed study are as follows:

- To identify the different digital literacy needs of students entering higher education at a UoT.
- To establish how the Web 2.0 applications used have facilitated students' acquisition of digital literacy.
  To investigate the perceptions of students on the use of Web 2.0 applications within the digital literacy course in facilitating their acquisition of digital literacy.

Research sub-questions

- What are the digital literacy needs of first-year students enrolling at a UoT?
- How have the Web 2.0 applications used in the digital literacy course facilitated students' acquisition of digital literacy?
- What are the student perceptions about the use of Web 2.0 applications within the digital literacy course in facilitating their acquisition of digital literacy?

1.4 Context and Rationale

Since 2014, the prevalence of emerging technologies in HE and online learning platforms such as Blackboard have promoted the integration of technology into teaching and learning processes (Ng'ambi & Bozalek, 2014; Park & Jo, 2017). Concurrently, the increased use of online learning platforms has further exposed the underdevelopment of first year students' digital literacy (Mirata et al., 2020). As such, it is critical to support students in developing

digital literacy. The importance of this has been emphasised by previous studies, underlining the necessity for digital literacy training, especially for first-year students transitioning to higher education (Singh, 2020; Tejedor et al., 2020). However, Barton and Lee (2020), advocates of digital literacy practices, conducted research on subject-related digital literacy training in the context of a business school. They investigated the connection of students' digital competence, academic success, career prospects, and examined how digital literacies were taught and integrated into business courses. The findings highlighted the need for universities to integrate discipline-specific digital literacy into the curriculum.

A study conducted by Alexander, Adams & Cummins (2016) on students and academics in the United States of America Higher Education Institutions (HEIs) contributed to the identification of three pivotal models: universal digital literacy, literacy across disciplines, and creative literacy. This study adopted the universal digital literacies model, which includes the basic technical, informational, and media literacy skills required for successful navigation in both educational and bigger digital contexts. Furthermore, the creative literacy model focuses on the shift from passive to active digital content creation. It is important to note that it is subset of universal digital literacies that students would require. According to these authors the literacy across disciplines model places a strong focus on integrating digital literacy into the curriculum.

In alignment with the universal literacy approach, a digital literacy course (using Web 2.0 applications) was rolled out at the start of the second semester of 2022. This approach aimed to equip first-year students, regardless of their previous digital literacy exposure, the basic skills needed to succeed in higher education. By adopting this approach, the goal was to address possible gaps in students' digital competencies as they transitioned from various high school backgrounds to universities. In keeping with the creative literacies concept, this approach also pushes students to become both creators and critical consumers of digital content, thus aligning with the creative literacies approach (Alexander, Adams & Cummins, 2016). This approach not only supports students' academic journey but also prepares them for active participation in the digital realm beyond the classroom.

While several research studies have investigated the use of Web 2.0 applications in developing students' digital literacy within the context of traditional universities, there is limited research on the utilisation of Web 2.0 apps to support first-year students in South African UoTs. Therefore, the purpose of this research study is to contribute to bridging gap by exploring the role of Web 2.0 applications in facilitating the development of digital competence among first-year Engineering students as they enter university.

The findings of this study hold potential to provide useful data for university decision-makers, particularly those involved in the UoT's First-Year Experience (FYE) program, regarding the implementation of a digital literacy course for first-year students. These findings can inform decisions related to the duration and structure of the course.

1.5 Digital Literacy at the UoT

This research was conducted at a South African UoTs, a face-to-face teaching institution that integrates digital technology into its curriculum to enhance teaching and learning. Following the emergence of the COVID-19 pandemic, the university needed to adopt emergency remote teaching, which revealed a lack of digital literacy among first-year students. The training offered previously from 2018–2020 covered topics such as computer hardware and software, file management, Internet navigation, and basic productivity tools like word processing and spreadsheets. Most of the instruction was delivered in-person (face-to-face) and included lectures, demonstrations, and practical hands-on activities.

However, in 2022 – at the same time this study was undertaken – the digital literacy course underwent transformation. Web 2.0 apps were utilised to support Engineering students acquire digital literacy. Blackboard built-in tools such as blogs and discussion forums, as well as YouTube were used to design the digital literacy course activities.

The researcher (and practitioner) developed the course; centering on Martin's (2008) three dimensions of engagement in digital literacy, which are aimed at facilitating student digital literacy development. These are:

- Digital Competence: The first dimension provided students with basic knowledge about digital technology, equipping students with essential skills necessary to effectively navigate digital tools and access online content. Digital competence functioned as the foundational building block, ensuring that students acquired a strong foundation in the basics of digital literacy.
- Digital Usage: Which is built upon digital competence focuses on the hands-on of digital literacy. Students learnt how to use digital resources for different purposes, including research, communication, and problem-solving. Competence in searching for information online, critically assessing digital content, and using digital tools for effectiveness were key skills.
- Digital Transformation: Which was positioned at the highest level of engagement, challenged students to think creatively and adapt to the constantly shifting digital landscape, making it a key aspect of advanced engagement. However, due to the

programme short duration, students did not attain this level of exploring how digital technology could disrupt traditional processes and create new opportunities within their academic context.

These dimensions have become crucial in today's context where digital literacy is an essential skill for personal, educational, and professional success. The purpose of the course was to support that student were adequately equipped to navigate, contribute to, and participate in a digital learning environment.

1.6 Thesis Chapter Outline

Chapter 2: Literature Review and Conceptual Frameworks

In this chapter, the researcher reviews the existing research on student digital literacy development. The relevant theories and concepts that provide background and context for the findings are analysed. A theoretical and methodological foundation for the investigation is developed by drawing on existing literature and findings.

Chapter 3: Research Design and Methodology

In this chapter the researcher discusses the research methodology adopted in this study. This research study adopted a explanatory sequential design to investigate first-year Engineering students' digital literacy needs and the process for acquiring digital competence. Quantitative research instruments, such as questionnaires, and qualitative research instruments, such as focus group discussions, are both discussed in this chapter as integral parts of the research process. This study contributes to existing knowledge on the role of Web 2.0 applications in developing students' digital literacy through the adoption of a case study and a mixed-methods methodology. The chapter further describes the analysis process, the study's trustworthiness, ethical considerations, and the study's limitations

Chapter 4: Findings and Discussion

The purpose of this chapter is to present the outcomes related to the research sub-questions, highlighting key findings from the analysis of data collected from first year Engineering students and encouraging discussion based on the collected data. The study's findings have advantages for educational institutions seeking to support students' digital literacy and integrate technology into their teaching practices.

Chapter 5: Conclusion and Recommendations

The researcher acknowledges the limitations of this study, summarizes the findings to present conclusions, provides recommendations to faculties in higher education based on the study findings, and offers suggestions for future research.

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORKS

2.1 Introduction

The increased use of information and communications technologies (ICTs) in every aspect of people's lives as well as the rapid speed at which current technology evolves and advances, forces higher education (HE) educators and students to adapt to new types of skills and digital practices.

The study primarily targeted first-year students at a South African University of Technology. The study was conducted in South Africa, focusing on the context of higher education institutions within the country. The research period reaches over 2 years, involving a thorough investigation conducted over 4 months starting in 2022. The primary objective of this study was to explore the role of Web 2.0 applications in facilitating the acquisition of digital literacy among first-year students enrolled at a South African University of Technology. Through this exploration, the study aimed to contribute to the advancement of digital education initiatives in the university of technology and provide valuable findings for educators and policymakers.

This chapter provides a literature review covering topics including online digital literacy resources, digital literacy and competences taught in higher education. It also discusses the delivery of digital literacy courses online, including how the utilisation of Web 2.0 apps in HE may support students' acquisition of digital literacy to improve their learning in traditional classroom settings to promote effective learning. In addition, the literature review also includes an outline of the theoretical underpinnings of the investigation and a summary of the relevant literature that was consulted to complete the analysis and position the study in the context of related studies. This chapter further presents the study's conceptual frameworks and describes key concepts that are used throughout the study.

2.2 Unpacking the Terminology: Digital Literacy, Digital skills, and Competence

Gilster (1997) first introduced the concept of digital literacy, who defined it as "the capacity to understand and make use of the information offered in various formats from a wide range of sources through the usage of computers and, more particularly, through the medium of the Internet" (Gilster 1997: 6). The digital European literacy (DigEuLit) research group (made up of universities in Spain, England, and Greece), among others, made contributions to the conceptualisation of digital literacy by creating a framework for digital literacy. Emanating from

research conducted between 2005 and 2006 by DigEuLit with students across universities in these countries, the following definition of digital literacy:

> "Digital literacy is the ability to recognise, manage, access, integrate, analyse, and synthesise digital resources to acquire new information, generate media expressions, and engage in social interaction in the framework of particular contexts. This perspective and these skills are also necessary for an individual to use digital tools and facilities effectively. They must be able to better understand this approach among others" (Martin & Grudziecki, 2006: 255).

What is significant is that via digital literacy, one gains fundamental thinking skills and core competences. Without it, navigating and participating in activities in an active learning environment would be impossible (Shopova, 2014). Regardless of any combination of digital literacy developments, students must think critically, evaluate, and choose information correctly (Kaeophanuek, Na-Songkhla & Nilsook, 2018) and the development of digital literacy should be seen as part of a 21st-century attribute (Ferrari, Punie & Redeck, 2012; O'Brien & Scharber, 2008).

2.2.1 Digital skills, competences, and literacy

Van Deursen and van Dijk (2015) state that digital literacy relates to a set of specific knowledge and competences, while skills pertain more specifically to the technical aspects of these knowledge and competences. Therefore, digital literacy should be viewed as the outcomes that are more practically applicable and measurable in terms of media, information, or digital literacies. The concept stated above refers to several features, ranging from simple access to more advanced elements such as media content integration, evaluation, and analysis. When researching digital literacies, skills, and competences, it is critical to consider the conceptual distinction as well as their overall importance and multi-layered structure (Iordache, Mariën & Baelden, 2017) (See section 2.2.2).

In the context of this study, digital literacy refers to students' knowledge, skills, and competences to perform activities within their digital learning context. Scholars such as Martin and Grudziecki (2006), define digital literacy as practical skills that involve the application of specific knowledge and aptitudes in the context of digital usage. Furthermore, digital competence is best understood as the capacity to transfer acquired information and skills to various contexts, whether at home or university. Therefore, digital literacy is a combination of knowledge, skills, and competences which enable students to access, understand, analyse, communicate, and produce digital material in a practical and applicable manner, for the objective of achieving individual and organisational goals (Martin & Grudziecki, 2006).

Martin (2006) identifies three dimensions of engagement in digital literacy: digital competence, digital usage, and digital transformation. Martin (2008:167) defines the first level as "mastery of digital competences," the second as "thoughtful usage ... of contextually appropriate application of digital tools," and the third as "critical reflection [including] the understanding of the transformative human and social impact of digital actions".

Digital competence forms the basis for the three stages of digital literacy engagement, encompassing a spectrum of themes and skills. These include fundamental visual identification, practical initiative skills, and the utilization of more advanced conceptual, analytical, and evaluative methods, along with heightened perceptions and awareness (Martin, 2008). As outlined by Martin (2006; 2008), the primary and most crucial stage of digital literacy engagement is digital competence applied to a specific domain context or profession. The second stage involves individual, group, or contextual digital usage and how one interacts with the culture of the context and community. The third stage, digital transformation, can manifest at individual, group, or contextual levels, signifying innovation and creativity as well as substantial change within the professional or intellectual sphere (Martin, 2008).

This research study adopted this framework, which allowed the researcher to trace the students' digital literacy development from prior knowledge through to digital competence, usage or digital literacy and transformation levels.

2.2.2 Digital literacy and literacies

Around the same period, New Literacies advocates, Lankshear and Knobel (2006, 2008), emphasised the advantages of conceptualizing the diversity of digital literacy and viewing it as a collection of literacies. They talk about the "technical stuff" and new "ethos stuff" where:

> 'technical stuff' relates to "using and constructing hyperlinks between documents and/or images, sounds, movies, etc.; text messaging on a mobile phone; using digital semiotic languages (e.g. emoticons in email, online chat space or in instant messaging); manipulating a mouse to move around within a text; reading file extensions and identifying what software will 'read' each file; navigating three-dimensional worlds online; and uploading images from a digital camera or digital phone to a computer or to the Internet; inserting text into a digital image, building multimedia role play universes online; choosing, building or customising a weblog template" (cited in Mayisela, 2019: 28).

Ng (2012:1066) expanded the concept of digital literacy to include technical, cognitive, and social-emotional aspects of learning with digital technology, both synchronously and asynchronously. This expanded framework sets digital literacy apart from new literacies by

acknowledging its multifaceted nature and emphasising the integration of both technical skills and socio-emotional competencies for effective participation in digital contexts. Pangrazio, Godhe, and Ledesma (2020) define digital literacy as individuals' capacity to engage in participate in lifelong learning activities and make a substantial contribution to society using technology in both synchronous and asynchronous contexts. According to Ng (2012), the technical dimension, involving operational literacy, pertains to the proficiency needed to operate computers and mobile devices.

In addition, the cognitive dimension, includes information literacy, which involves the skills to search for and evaluate digital information, as well as critical thinking, creativity, paraphrasing acknowledging and attributing source of original texts. By equipping students with these competences, we can encourage the development of writing skills, creativity, and innovative ideas, while actively discouraging plagiarism and preventing related issues. This training serves as a catalyst for improving students' writing skills, thereby contributing to their academic success.

Related to this, Gokcearslan, Solmaz, and Coskun (2019) explored the relationship between technology and critical thinking, emphasising skills like material selection, critical thinking, creativity, successful interaction, and attention to electronic security. Their findings emphasised how technology contributes to the development of digital literacy and cognitive skills by highlighting the connections between its usage and the development of critical thinking skills. This aligns with Ng's (2015) technical-cognitive and social-emotional dimensions. Ng (2015) defines the technical-cognitive dimension as involving the creation and use of various media applications, online research, organizing digital content, and making decisions about specific digital technologies. At the intersection of cognitive and social-emotional dimension are skillsets required for social networking etiquette, reputation management, and cyber safety. According to Ng (2015), social networking functional literacy is the combination of technical and social-emotional skillsets that allow one to use social media for learning, socialisation, and interaction. Lordache, Mariën, and Baelden (2017) analysed 13 digital literacy models alongside Ng's dimensions, identifying five crucial categories emphasised in these models.

- The first category involves operational, technical, and formal abilities related to computers and the Internet.
- Information cognition, covering efficient searching, access, and critical evaluation of digital information, constitutes the second category.

- The third category highlights skills for digital communication, such as online interaction, engagement, collaboration, and participation in Web 2.0 applications.
- The fourth category focuses on the development of digital material, including multimedia production, digital storytelling, and content selection.
- The fifth category encompasses competencies needed for effective Internet use, addressing topics like online privacy, digital identity, and information management.

These categories collectively represent a complex dimension of digital literacy (Lordache, Mariën & Baelden, 2017). The cognitive and social-emotional dimensions of digital literacy interact when it comes to using the Internet effectively for learning, socialization, communication, and collaboration. Such factors of digital literacy include knowing how to protect one's privacy and personal safety as well as appropriate online behaviour, or "netiquette" (Ng, 2012:1068).

Even though some initiatives were put in place to improve students' digital literacy with ICT and technical resources, or at least ensure that they were competent with the basics, I did not find any structured steps taken to build on these initiatives or to communicate the development of students' digital literacy for the expansion of their access to more online learning materials. This is although, in the current context, researchers, educators, and universities throughout the world have made the development of digital literacy and competences a top priority to guarantee students full participation in today's increasingly digital society (Lordache, Mariën & Baelden, 2017). The existing research lends some support to the idea that students will benefit from a more comprehensive understanding of digital literacies, particularly in the realm of knowledge-related activities.

Given the broader context of integrating digital technology into education, the researcher narrowed down the focus to Web 2.0 applications to explore their specific role in supporting students' digital literacy development. While holistic perspectives and frameworks provide valuable insights into digital literacy, focusing on Web 2.0 applications allows for a more targeted investigation of their practical implementation and effectiveness in enhancing students' digital literacy skills. This approach enables a nuanced understanding of the unique affordances and challenges associated with these specific tools, which can inform more tailored strategies for digital literacy training.

The study focuses on the technical dimension of digital literacy acquiring practical skills and knowledge necessary to navigate digital resources efficiently. The aim was to equip students with the technical competences required to effectively use digital tools and online learning

platforms. The social-emotional dimension encompassed elements related to ethical online engagement, cyberbullying, digital wellbeing, and adept navigation of online environments. This dimension recognised the significance of promoting responsible digital behaviour, maintaining a positive online presence, and effectively managing potential challenges in digital interactions.

2.3 Using Web 2.0 Tools and Applications in Higher Education

In 2007, O'Reilly introduced the concept of Web 2.0, which has had a huge impact on the Internet since it provides the opportunity possible for students by enabling active user interaction and content development in the context of their study (O'Reilly, 2007). Due to its interactive nature, Web 2.0 applications enables dynamic information sharing and collaboration between students and web tools which can facilitate communication, information sharing, and networking among students (Hsu, Ching, and Grabowski, 2014). Utilising social media, which has become an integral part of Web 2.0, makes it simpler for students to communicate with each other, exchange information with each other, and collaborate for learning purposes in higher education (Gamji, et al., 2022). This includes establishing connections with students and educators. This interconnectivity results in the establishment of a complex network of relationships, which enables the rapid sharing of information among various user groups.

According to Crook (2008), Web 2.0 applications is a collection of online application and services that provide users with a voice while also demanding them to understand and process information in a variety of formats. Sharing information with a certain group or a wider audience is now simple and usual because to the availability of this technology. Additionally, it is an essential means of interaction and communication for educators and students using this approach. In addition, Rennie and Morrison (2013) concur with Siemens (2004) who advocate that technology and Web 2.0 applications facilitate the process of education that goes beyond constructivism. Students participating in collaborative learning activities might decrease divisions within a classroom and individual activities and towards interactive exchanges of information between students. This approach, often associated with connectivism by Siemens (2005) or collaborative constructivism as emphasised by Alismaiel, Cifuentes-Faura & Al-Rahmi (2022) focuses more on including the student into the learning process and active engagement. As a third option, Ackermann (2004) emphasised an active and experiential approach to knowledge acquisition, emphasising both individual and group efforts in the process of learning.

Web 2.0 applications have the potential to facilitate student collaboration, communication, and interaction, which can improve the learning experience for students. This is another key point to emphasise. These digital resources often facilitate peer-to-peer learning, information sharing, and the development of a sense of community sharing, and development within an online learning environment (Featro & DiGregorio, 2016; Leu et al., 2013). It is important to emphasise that while Web 2.0 applications have the potential to influence students' academic independence, their actual impact depends on a variety of contextual factors. To fully evaluate their role, it is imperative to consider how these tools are integrated into the larger educational framework and how they align with the overarching goal of developing independent and critical learners (Mayisela, Hodgkinson-Williams & Brown, 2019; Ng, 2012).

Web 2.0 applications are positioned to enhance academic independence among students, transitioning from traditional face-to-face interactions with educators to self-directed learning in an online environment (Featro & DiGregorio, 2016). They are also believed to develop innovation and critical thinking skills in students (Cain et al., 2012; Shahsavar & Hoon, 2010; Shahsavar et al., 2013). A study by Shahsavar and Hoon (2010) highlighted that blogging, for instance, contributes to improved critical thinking by encouraging creative risks, enhancing academic literacy, and reducing code-switching in the classroom.

According to Grosseck (2009), the features of Web 2.0 applications that allowed students to interact, actively contribute to the creation of information, and share (exchange) online knowledge are what caused the shift in teaching approaches. Additionally, in the context of education, Basitere and Mapatagane (2018) conducted a study at aUoT in South Africa to better understand how first-year Engineering students used social media. According to their research, students' engagement levels considerably increased when they chose well-known social media sites over their institutional. Students who used social media developed deeper relationships, took part in group projects, and improved their overall learning outcomes. In addition, the integration of Web 2.0 apps and social media has fundamentally changed the digital world by enabling students to engage with and actively participate in online content.

Basitere and Mapatagane (2018) highlight how crucial social media is for encouraging important connections and communication among students, making it a useful tool in the educational context. Also, because they both create and share information, social media users are frequently referred to as 'prosumers' (Ritzer & Jurgenson, 2010; Yuen, Yaoyuneyong & Yuen, 2011). According to Mpungose's (2020) research, students could engage in discussions even if their Internet access were limited as they could access free data bundles from their

social media accounts. Alloway et al. (2013) argue that increased utilisation of social media and Web 2.0 for educational purposes linked with improved academic outcomes.

In the broader educational context, Web 2.0 applications have the capacity to facilitate self-directed learning, but their impact on academic independence varies based on integration methods. Factors such as course design, pedagogical strategies, and specific tools used influence students' reliance on digital platforms. A nuanced understanding is crucial as the influence on academic independence is complex (Brown & Davis, 2019; Smith & Johnson, 2020). Academic independence extends beyond physical separation from educators; it involves students taking responsibility for learning, making informed decisions, and critically engaging with course materials. While Web 2.0 applications offer opportunities for self-guided exploration, their effectiveness in promoting academic independence relies on alignment with pedagogical goals and the presence of adequate support structures (Anderson & Reder, 1996; Vygotsky, 1978).

Students can gain skills that will help them read more carefully, think critically, and write more extensively as a result of their efforts. Utilising a weblog can aid students in improving their social interaction and collaborative skills, as well as in reflecting on and discussing their prior knowledge. While specific blogging practices, such as commenting on peers' blogs, have been shown to enhance critical thinking (Gifford, 2010; Shahsavar & Hoon, 2013; Wang & Woo, 2010), it is worth noting that various other Web 2.0 applications, such as wikis, discussion forums, and social media platforms, can also contribute to the development of critical thinking skills among students. These platforms offer diverse opportunities for collaborative learning, knowledge sharing, and engagement with course material, all of which are conducive to developing critical thinking abilities. Therefore, while blogging practices may indeed be effective, they are not the only means by which students can enhance their critical thinking skills within the digital learning environment.

Applications developed for Web 2.0 are intended to increase community engagement, collaboration, and knowledge sharing (Guth, 2007). Scholars such as Roodt and De Villiers (2011), Rennie and Morrison (2013), Siemens (2004) and Avci and Askar (2012) further argue that Web 2.0 applications are important in promoting collaboration among students. The utilisation of a Web 2.0 application (YouTube) to promote collaborative learning is emphasised by Roodt and De Villiers (2011) who believe that this creative learning tool may boost students' enthusiasm to grasp computer skills. The study found that integrating YouTube into undergraduate education improved students' knowledge and proficiency in information systems (IS).

It is against this backdrop that the researcher explored how first-year students at UoT acquire digital literacy through the utilisation of Web 2.0 applications. The conceptual framework for digital literacy is clarified in Section 2.5 and offers understandings into the development of students' digital literacy in this realm.

One of the objectives of the study was for students to acquire digital literacy through their participation in the use of Web 2.0 applications. Therefore, the aim of the current study was to explore how Web 2.0 apps could actually be used as a teaching tool to enhance students' digital literacy for academic purposes.

2.4. Higher Education Students' Digital Literacy

Students from disadvantaged backgrounds face challenges adapting to university-level academic standards, especially in the digital realm (Terenzini et al., 1996). While comfortable with personal digital use, transitioning to academic settings proves difficult. Many first-year students, especially from economically disadvantaged backgrounds, lack exposure to digital tools for educational purposes, hindering critical digital literacy essential for academic and professional contexts (Lee Shong, 2020). Consequently, these students struggle with digital requirements in higher education, such as accessing online platforms, using research resources, and collaborating effectively in virtual environments. Hence, the development of students' digital literacy is crucial for success in today's technology-driven educational landscape.

At UoT, findings from the 2021 and 2022 Beginning University Survey of Student Engagement illuminated three main points: the majority of first-year students were from low socioeconomic backgrounds; most of them were first-generation university students who are first to graduate in their families; and students lacked digital literacy. The amount of time and effort put into teaching digital literacy in high school was inferred from the BUSSE nine scale indicators, which in turn can be used to predict first-year academic engagement and performance. Importantly, these findings enabled the university to evaluate students' digital literacy, thereby exposing students' academic readiness. This information is important for designing interventions and support structures to enhance students' academic experiences enabling their success in their first year at university.

Lastly, the implementation of the BUSSE and subsequent analysis of its outcomes have contributed substantially to the institution's understanding of the students' backgrounds, needs, and areas that needed improvement. These findings have contributed to the design of

specific questions in the current study's questionnaire and have influenced the design of the digital literacy course.

2.5 Digital Literacy Development and Integration

Digital literacy is increasingly recognised as a vital skill for success in higher education and active participation in today's digital society (Ng, 2012), especially for first-year students at a UoT. The adoption and effective use of technology are noted to yield benefits in improving digital literacy and technical competences, as emphasised by Mbunge et al. (2020). Nationally, in South Africa, there is a growing emphasis on the importance of digital literacy, with various initiatives and strategic plans aimed at enhancing the digital literacy of citizens (Law et al., 2018).

Maphosa and Bhebhe (2019) emphasise the necessity for students to have strong digital literacy to enable them to effectively use online learning material and technologies in the learning process. Moreover, Lankshear and Knobel's new literacy studies offered a valuable perspective through which the researcher explored the diverse literacies required in today's intricate digital landscape. Their emphasis on multiliteracies recognises that digital literacy extends beyond technical competence and involves critical and creative practices across various digital contexts (Lankshear & Knobel, 2006).

To promote digital literacy, applications like social networking sites, blogs, wikis, and online collaboration tools help students build digital literacy by allowing them to participate in active and collaborative learning (Martin, 2008). There are many advantages to developing the individual's digital literacy through using Web 2.0 applications. First, they give students access to a variety of information and resources, allowing them to explore different points of view, critically assess sources, and develop their information literacy (Hsieh & Wu, 2017; Hwang, Zou & Wu, 2023). Second, students are encouraged to participate actively and collaborate using these applications (Dabbagh & Kitsantas, 2012), which helps develop digital literacy like communication, teamwork, and digital citizenship. Web 2.0 applications promote student innovation, digital writing, and communication skills through the sharing of student-generated digital materials.

Consequently, several studies have pointed out how Web 2.0 applications may help students to enhance their digital literacy. Chen et al. (2021), for example, found that students' critical thinking and reflective writing skills improved because of their usage of blogs. Li and Ranieri (2010) indicated that when social media were integrated into the classroom, that led to enhanced student collaboration and improved information consumption skills among students.

Furthermore, blogs have been shown to improve students' information literacy and ability to create new knowledge (Pimmer, Mateescu & Grohbiel, 2016).

A lot of studies have explored the feasibility of integrating non-discipline-specific digital literacy in higher education curriculum. For instance, Smith and Storrs (2023) investigated how digital literacy training increased students' capacity to use digital resources for research, data analysis, and patient care at a medical institution, focusing on healthcare-related disciplines. With an emphasis on teaching digital literacy within a discipline-specific framework, Mayisela, Hodgkinson-Williams, and Brown (2019) conducted a study focusing on the integration of digital literacy into the curriculum of commerce and humanities at a university. Additionally, Mayisela et al. (2019) emphasised the need of supporting students in acquiring discipline-specific digital literacy to enable them to engage successfully and actively in the context of their courses.

However, the successful integration of Web 2.0 applications for the development of digital literacy, requires cautious planning and pedagogical support, whereby educators create learning activities that align with specific learning objectives and provide clear guidelines for the ethical and responsible use of digital tools (Ng, 2012). Furthermore, Hwang, Zou, and Wu (2023) emphasise that scaffolding, and support should be provided to aid students in navigating and making sense of the vast quantity of information available online. Moreover, the contributions from other literary scholarship enriched the researcher’s theoretical foundation. McLoughlin, for instance, emphasises the importance of digital literacy in developing students' knowledge, evaluation, collaboration, and communication skills (McLoughlin, 2011), while Luić and Alić (2022) delve into participatory culture and the transformative role of digital tools for students' development.

Grounded in the theoretical foundations, the researcher sought to contribute valuable insights into the acquisition and use of digital literacy in higher education contexts. The concept of "affinity spaces” emphasises the importance of creating learning environments that facilitate social interactions and shared information, enabling students to involve themselves in collaborative practices (Gee, 2004:67). This perspective informs the researcher approach to cultivating digital literacy through active participation and engagement within the digital environment. Students developed their digital competence of Ng's (2015) technical, cognitive, and social-emotional dimensions (based on the current areas of concentration in the UoT digital literacy course).

Prior to the COVID-19 pandemic, the institution offered a face-to-face digital literacy course to first-time entering students. However, the shift to online learning necessitated by the pandemic prompted the institution to reconsider its approach to student intervention. As a result, the development of online student support courses became imperative to provide assistance in navigating the online learning environment, facilitating both synchronous and asynchronous learning experiences for students. This adaptation highlights the importance of agile and responsive approaches to supporting students in the rapidly evolving landscape of higher education. Drawing on the COVID-19 experiences, the researcher designed a blended digital literacy course supplemented by the integration of Web 2.0 applications such as YouTube, blogs, discussion forums, and the MS Office suite to develop students' digital literacy (see Appendix 6). The content of the course was informed by the BUSSE and questionnaire data. With respect to course format, there was a series of four workshops offered over two weeks where each workshop was followed by asynchronous online activities such as blogging or contributing to a discussion on Blackboard.

2.6 Exploring the Utility of a Digital Literacy Development Framework

According to Neumann, Finger and Neumann (2017), researchers and educators have called for the conceptualisation of a shared digital literacy framework that interacts between emerging literacy skills, emerging digital literacy as well as reading and writing proficiency. Also, there is very little research available on the skilled-based approach to instructing digital literacy in higher education. Related research has argued that integrating learning and assessment activities into the curriculum increases the probability that students will develop digital literacy (Mayisela, 2019).

Various frameworks aim to develop students' digital literacy, addressing local community needs by combining social and technical elements. These frameworks, including multidisciplinary literacy, universal literacy, and creative literacy, provide not only technical skills but also access to resources and life skills. For example, Nedungadi et al. (2018) demonstrated integrating digital literacy into the curriculum, benefiting over 1,000 indigenous people in rural villages. Using the proposed Digital Framework for Inclusion, a mobile learning technique proved successful in developing digital literacy, raising awareness, and enhancing life skills among low-literate students in remote tribal communities. This approach showed higher examination success rates and reduced dropout rates compared to conventional methods of teaching digital literacy (Nedungadi et al., 2018).

Higher education in South African context has effectively adopted the DigEuLit project's digital literacy framework to help students enhance their digital literacy. Within this approach, digital competence, digital usage, and digital transformation represent the three levels of digital literacy engagement. According to Grudziecki and Martin (2006:257):

> The person *recognises a need for digital competence* to perform a task or achieve an objective. Then, *he or she can learn the necessary digital literacy* using whichever learning method is offered and selected. Then, in the context of the work, where it is informed and molded by the knowledge and skills relating to the profession or discipline context, he or she can use the newly acquired digital competence appropriately. *Digital usages are the deliberate applications of technological knowledge in real-world contexts* [italics added].

Martin (2008) states that individuals do not always proceed sequentially through each level. The individual draws on digital competence based on the task requirement and context and when necessary, they learn the needed skill. That is, digital usage is oriented towards solving a problem, completing a task, or achieving some other objectives within the context of a profession, discipline, or another context. The third level, digital transformation, occurs when the developed digital usage develops innovation and creativity while also stimulating major change within a discipline or context.

This transformation may occur at the individual, group, or institutional levels (Figure 2.1).

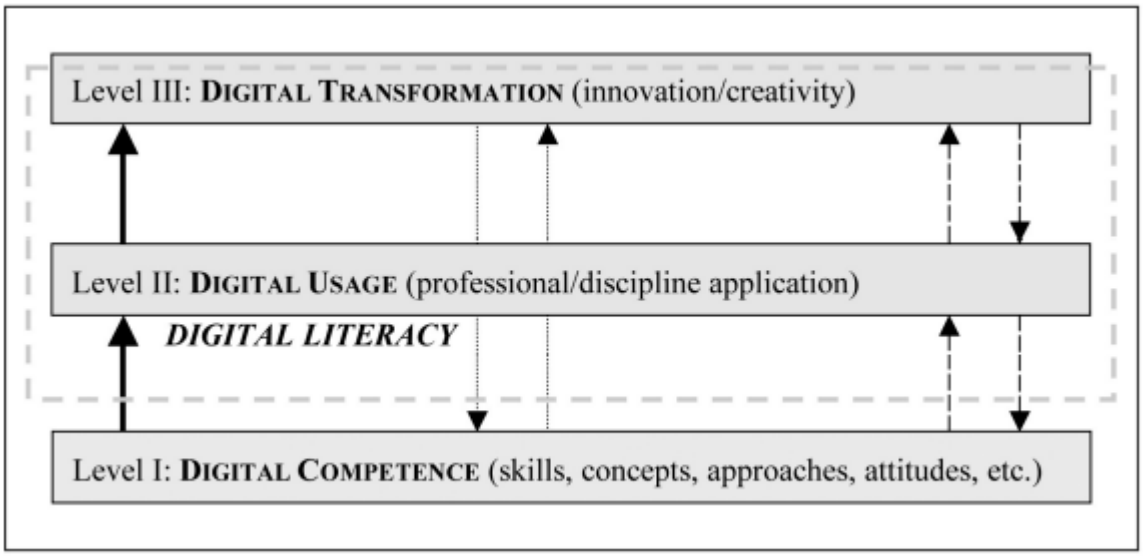

Figure 2.1: Levels of digital literacy framework (Martin, 2008:167)

Chan, Churchill, and Chiu (2017) adopted Martin's (2008) framework to explore how digital storytelling practices impact the acquisition of digital literacy among Hong Kong university

students. The study revealed significant development in digital competence, covering various skills like information literacy. Proficiency in digital usage, including activities such as using social media and collaborating online, also improved among the students. The qualitative approach involved interviews with three participants from a multimedia course, selected purposefully for diverse perspectives. The research achieved depth through artefact analysis of materials created during digital storytelling factors, which highlighted the contribution of digital storytelling to the development of digital literacy among individual university students. Martin's framework was adopted in this study to provide the investigation a strong theoretical basis.

The study highlighted the positive outcomes of digital storytelling practices and highlighted the importance of integrating such innovative methods in educational settings to empower students with essential digital competences for success in the digital age.

The current research study focuses on the two levels of developing digital literacy in students: digital competency and digital usage. The study investigated the digital literacy that students must acquire to become digitally competent and use these skills in classroom environments. The Digital Literacy course that was developed and used by first-year students in 2022, and in turn, served as the basis for the qualitative element of this research.

This course also formed the basis for the qualitative aspect of the research, allowing for in-depth exploration of students' experiences and learning outcomes. To analyse the collected data, both quantitative and qualitative, two software tools were employed: SPSS and NVIVO (Figure 3.1). SPSS was utilised for the analysis of quantitative data, such as questionnaire responses and numerical measurements, while NVIVO was employed for qualitative data analysis, including focus group session and open-ended responses.

The research study primarily focused on two levels of digital literacy development: digital competence and digital usage. To analyse students' digital literacy development comprehensively, Martin's digital literacy framework was adopted, allowing for a structured investigation of digital competency and usage across different dimensions.

While not focusing on levels of development, the study uses Ng's framework for digital literacy to show the dimensions of digital literacy that students acquire. Based on Ng's (2015) research findings, Ng's digital literacy framework offered a thorough approach for first-year students to acquire and improve their digital literacy. The conceptual framework offered a comprehensive view of digital literacy by acknowledging the interdependence of the technical, cognitive, and

social-emotional dimension and emphasising the significance of addressing these dimensions together to succeed in the digital realm.

The digital literacy framework proposed by Ng (2015) is shown in Figure 2.2.

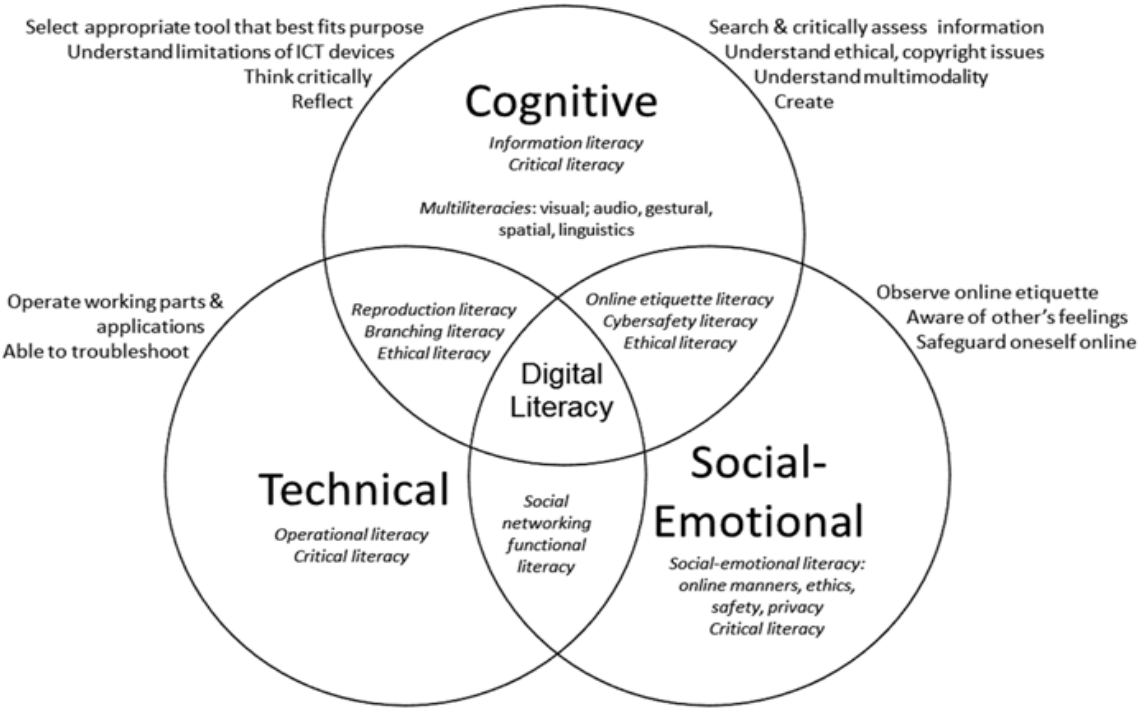

Figure 2.2: Digital literacy framework (Ng, 2015:130)

The study adopted Ng's (2015) framework for digital literacy, which categorized digital literacy into three main dimensions: technical, cognitive, and social-emotional. The way these dimensions are connected within the framework emphasises the interdependence and interplay between many digital literacy practices. The critical thinking, problem-solving, searching, and effective evaluation of information are the main elements of the cognitive dimension of digital literacy. It emphasises the development of students' skills to critically analyse digital content, evaluate, make informed decisions, and assess the credibility of digital sources. It is against this backdrop, that at its core, an e-learning platform makes use of both tried and trusted and cutting-edge technologies to facilitate students' communication, collaboration, and even the development of new pedagogical approaches using Web 2.0 applications.

The current study aims to explore how students, a significant portion of whom may lack digital literacy, engage with Web 2.0 technologies to develop digital competence. In this context,

digital competence involves using digital tools successfully and ethically for tasks like communication, information retrieval, problem-solving, and digital practices. Digital usage encompasses applying digital technology in daily activities, including productivity tools, social media, online services, and digital material for learning. Ng's (2015) digital literacy framework, which categorizes dimensions into technical, cognitive, and social-emotional aspects, serves as the basis for this study. The cognitive dimension emphasises critical thinking, problem-solving, and information evaluation, while the technical dimension focuses on practical skills for navigating and using digital resources. The social-emotional dimension addresses ethical online engagement, digital well-being, and effective navigation of online environments, with these dimensions interrelated in the digital literacy framework (Ng, 2015).

2.7 Summary

Chapter 2 outlined research within the realm of digital literacy and its different dimensions in higher education. It explored the connections between digital literacy, digital literacies, competence, and the framework designed to facilitate student development of digital literacy. The study, conducted during the second semester, the chapter emphasised the practical application of non-discipline-specific benefits of the Digital Literacy course within a higher education South African context, particularly among second semester first-year Engineering students.

CHAPTER 3: RESEARCH DESIGN

3.1 Introduction

This chapter provides a thorough overview regarding the research approach, methodology, data collection process, analyses, ethical concerns, and factors associated with credibility, reliability, and authenticity. Theoretical frameworks such as positivism, post-positivism, constructivism, interpretivism, and pragmatism are among the perspectives considered in this discussion of the chapter. The aim of this study was to explore the effectiveness of utilising Web 2.0 applications to facilitate the development of digital literacy among first-year students in a UoT.

Research question

What is the role of Web 2.0 applications in the acquisition of digital literacy by first-year students at a South African UoT?

Research objectives:

Given the various opportunities that are afforded through the use of Web 2.0 applications as pedagogical tools, the objectives of the proposed study are as follows:

- To identify the different digital literacy needs of students entering higher education at a UoT
- To establish how the different strategies used have facilitated students' acquisition of digital literacy.
- To investigate the perceptions of students on the use of Web 2.0 within the digital literacy course in facilitating their acquisition of digital literacy.

Research sub-questions:

- What are the digital literacy needs of first-year students enrolling at a UoT?
- How have the Web 2.0 applications used in the digital literacy course facilitated students' acquisition of digital literacy?
- What are the student perceptions about the use of Web 2.0 applications within the digital literacy course in facilitating their acquisition of digital literacy?

3.2 Research Orientation

There are four primary paradigms used in the study of social science today: positivism, critical realism, interpretivism, and pragmatism. Creswell (2014), Creswell and Creswell (2017), and Mertens (2019) have identified a selection of research paradigms in social science that are able to be interpreted as worldviews. The interpretative paradigm was adopted for this study because of its emphasis on understanding the meanings that individuals (in this study, students) attach to their activities, which made it applicable to the field of study. It also helped meet the study's main objective. In terms of structure, this approach guided the whole study, directing every aspect of it from data collection and analysis to interpretation of the findings. The term "interpretivism" describes theories, epistemologies, and values that focus on how knowledge about the everything can be learned through the interpretation or understanding of phenomena by individuals.

According to interpretivists, the study of human society should also consider subjective opinions, perceptions, feelings, and values. These are factors that cannot be measured or directly observed (Alharahsheh & Pius, 2020). That is, interpretivism emphasises using subjective opinions, perceptions, emotions, and values in the study of human society in addition to empirical data and other theoretically objective facts. According to Pham (2018), one benefit of using interpretivist research methods is that the results are reliable and close to reality. This research study followed a case study design.

3.3 Case Study Design

An explanatory, single case and case study was the approach that was selected for this study. With the use of this approach, the researcher was able to investigate and unpack a particular phenomenon in relation to its actual context. According to Smith, Webber and DeFrain (2013) and Yin (2009), the case study approach offers a deeper understanding of why something happened and identifies areas for further investigation. However, one limitation of case studies is that their findings may not always be generalisable to a larger population (Hodkinson & Hodkinson, 2001; Simon & Goes, 2013).

This study was conducted during the second semester of the university's second intake of new students in the Faculty of Engineering, to explore the role of utilising Web 2.0 applications on the development of digital literacy among engineering students. By exploring the integration of Web 2.0 applications in the educational process, this study aims to provide an understanding of how Web 2.0 applications may be effectively integrated into the teaching process and improve the digital literacy of second semester engineering students. The findings

of this study will be very helpful in understanding the possible advantages and difficulties of using Web 2.0 apps in the classroom, specifically in the context of engineering education. Additionally, to gain a full understanding of the phenomenon under study, the study used a mixed-method approach, combining qualitative and quantitative data collection methods.

3.4 Mixed-methods Approach

By combining quantitative (questionnaire) and qualitative (focus groups) research methodologies, this study used a mixed methods approach to explore the phenomena of the development of digital literacy among first year Engineering students. According to Creswell (1999), a mixed-methods approach combines qualitative and quantitative methodologies by adopting a variety of structures, including perspectives and theoretical systems. Stated differently, a mixed-methods approach, as opposed to a single method, enabled the researcher to have a deeper comprehension of a research problem (Creswell & Plano Clark, 2007). Creswell and Clarke (2017:116) defined a mixed-methods case study design approach as “a type of mixed-methods study in which the quantitative and qualitative data collection, results, and integration are used to provide in-depth evidence for a case(s) or develop cases for comparative analysis”.

An explanatory sequential mixed-methods approach was used in this study. According to Fetters, Curry, and Creswell (2013), explanatory sequential design is a mixed-methods study approach in which qualitative data collection and analysis follows quantitative data collection and analysis, leading to findings. Using an explanatory sequential mixed-methods approach improved the quality of the research. A study of this kind is strengthened by integrating mixed-methods research approaches into collecting and analysing data, integrating the findings, and deriving findings from the combination of quantitative and qualitative research analysis (Smith, Webber & DeFrain, 2013).

There were two stages to this research project: Phase 1 involved the distribution of a questionnaire to collect data that enabled the researcher to evaluate students’ digital literacy prior to university and their self-identified requirements in this area. The next step was digital literacy training. For Phase 2, focus groups were held to determine what students had acquired through the course and their perceptions about the course and the use of Web 2.0 applications.

Figure 3.1 illustrates how the researcher first collected and evaluated quantitative data, and then used qualitative methods to investigate, explain, and interpret the qualitative findings.

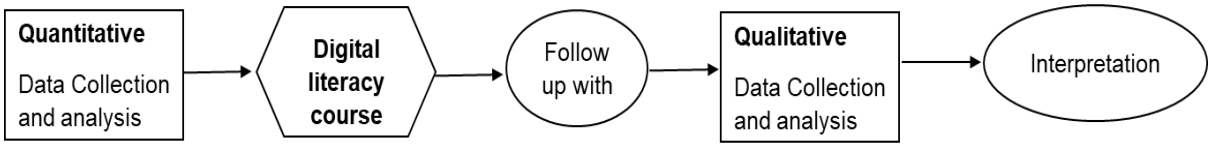

Figure 3.1: Explanatory sequential mixed method approach

3.5 Site of the Research, Participants and Sampling

Research participants were purposefully selected from first-year university students because they met the criteria to identify the study population consistently, reliably, uniformly, and objectively and would be able to contribute meaningful data. This was done with the hope that UoT would gain useful information on how to integrate or adopt digital literacy into its existing curriculum. The adoption of purposive sampling increases the trustworthiness of data and findings by making selections that are more closely related to the study's aims and objectives (Campbell et al., 2020).

The questionnaire was made available on the front page of the Blackboard LMS with a specific focus on second-semester new students. Out of the 671 eligible second semester students, only 282 of them (275 from Engineering and 7 from Natural Sciences) completed the questionnaire, primarily due to registration delays. In terms of the focus groups, there was a total of 27 Engineering participants, which is why eliminated the Natural Sciences students. The focus group participants were divided into manageable groups of nine students per group.

3.6 Data Collection

Data was collected in two phases: the researcher recruited a purposive sample of the first-year students who participated in the training to complete the questionnaire. Two weeks after the training and associated Web 2.0 activities, the researcher held focus groups to elicit how the students' skills had improved.

An overview of how research questions and data collection methods interacted is provided in Table 3.1 below.

Table 3.1: Research questions and data collection methods

Concepts	**Research questions and instruments**	**Questionnaire**	**Focus groups**
Digital literacy needs	Sub-question 1	x	
Acquisition of digital literacy	Sub-question 2		x
Student perceptions on how the programme has worked	Sub-question 3		x

3.6.1 Phase 1: Questionnaire

A questionnaire was administered from 23 to 29 August 2022 to collect data that would help the researcher establish Engineering students' digital literacy prior their enrolment at university and their self-identified digital literacy needs (see Appendix 1). To create the questionnaire, Google Forms was used, a web tool that can used to manage survey distribution. It provided fundamental built-in capabilities that, despite their limitations, assisted in the creation of a questionnaire in a straightforward manner. It was accessible to participants by a link that could be shared, and Google Sheets was used to compile the results from the data, which was later exported to SPSS. In the last section of the questionnaire students were asked to indicate their interest to participate in the follow-up focus group.

For this study, an indirect data collection method, specifically a questionnaire, was adopted to gather information. Participants were given time to carefully consider their responses, and confidentiality and anonymity were assured for correctly accessed questionnaires. The questionnaire covered sections on biographical information, technology access, use and

ownership, digital literacy, and digital literacy needs. The widespread use of questionnaires in published studies and student projects in education attests to their popularity, frequency, and utility. Questionnaires offer advantages such as simplicity, versatility, and low cost, contributing to their popularity in research. In the current study the questionnaire was distributed over a two-week period on the front page of the Blackboard LMS. Firstly, this was to allow more students who are part of the sample to take the questionnaire. Secondly the computer laboratory environment used to reduce the possibility of non-completion of the questionnaire. The questionnaire, in the form of a Google Form, was completed by students in the presence of the researcher, who was available to address any queries.

The distribution of the questionnaire provided valuable data about student's prior digital literacy experience and allowed for data collection while their memories of high school digital literacy lessons were still memorable. By adopting purposive sampling during training sessions ensured student participation. However, challenges emerged during completion, particularly due to educational under-preparedness such as digital and English language competence issues. To address these challenges, students were granted additional time to complete the questionnaire under the guidance of both the researcher and Student Academic Advisors. This adaptive approach allowed for a more inclusive data collection process, ensuring that all participants had the opportunity to contribute their perspectives effectively.

3.6.2 Digital literacy course

Students undertook the digital literacy course (dates) that embedded Web 2.0 tools, such as YouTube, blogs, and discussion forums (see Appendix 6 for details about the course).

Table 3.2 outlines the competences covered in the course.

Table 3.2: Competences covered in the digital literacy course

Topics	**Digital literacy dimension**	**Tools used**
Teams, Zoom, basic skills on how to use a computer, file management, and intro. to Blackboard, email, MS Office packages	Technical	YouTube embedded within the LMS
Critical thinking skills, Library tools, and databases, searching for information, reducing plagiarism	Technical and Cognitive	Blog and discussion forums embedded within the LMS
Digital communication, socialising/social skills	Social-Emotional	MS Office suite (Emails and Teams)
Collaboration and teamwork	Technical-Cognitive	Teams

The digital literacy course covered a range of competences essential for navigating the digital landscape effectively. Firstly, clear guidelines and objectives were established for each workshop to ensure consistency and impartiality in the delivery of content. Additionally, feedback from students was actively solicited and integrated into the course design to address any potential biases or instructional gaps. Moreover, the researcher-maintained transparency throughout the training process, encouraging open dialogue and critical reflection among participants to develop an environment of mutual learning and growth. Overall, these measures helped to minimise researcher bias and ensure the effectiveness and objectivity of the digital literacy course.

3.6.3 Phase 2: Focus groups

Focus groups were conducted after training over a one-week period with nine participants per group (3 groups) so that none of the participants dominated the discussion while others faded into the background. The participants for the focus group study were selected based on their interest in participating and their availability after completing the training sessions. Time

allocation per session was one hour. The 27 students were divided into three manageable focus groups. The interaction classroom (TLDC lab) served as the ideal setting for the focus groups, providing a quiet, comfortable, and safe space for participants to freely express their thoughts and opinions.

The use of focus groups in this study aimed to capture students acquired digital competences and usage resulting from training, along with their perceptions of using Web 2.0 applications for digital literacy. Focus groups offer diverse viewpoints and perceptions, generating richer, communal perspectives through participant interaction (Cohen, Manion, Morrison, 2007). Compared to individual interviews, focus groups allow for more data collection in a shorter time frame and can serve as a forum for change (Race et al., 1994). Cohen, Manion, and Morrison (2011) emphasise that when focus group participants are "relative strangers," the data collected becomes significantly richer.

For this study, the researcher adopted a digital literacy framework for thinking about digital literacy intervention as a system of active learning. The questions that were asked in the focus groups (which can be found in Appendix 2) were designed in such a way that the researcher would be able to learn about the digital literacy practices of the students and the socio-cultural elements that influenced such practices during the learning activities.

The questionnaire served as a reliable tool for systematically collecting information. Furthermore, collecting participants' perceptions helped in measuring their comprehension and application of the knowledge, skills, and attitudes displayed during the course. Finally, the data collected from the focus group discussions shed light on students' perspectives regarding the significance of Web 2.0 tools in bolstering their digital literacy.

3.7 Data Analysis

For the analysis data was exported from the Google Form that was used to create the questionnaire, offering a comprehensive approach to data collection, management, and processing. In Chapter 4, tables, graphs, and descriptive statistics are used to present the quantitative data from the questionnaire that was compiled and analysed using Statistical Package for the Social Sciences (SPSS), such as information about participants' biographical data, the technologies they use, and their levels of digital literacy and needs.

During Phase 2 of the study, focus group data analysis was performed using NVivo, with Martin's (2008) levels of digital literacy framework serving as the analytical framework. This framework allowed for describing changes, if any, in participants' digital literacy levels (competences, usage, and transformation) after engaging in course and completing learning

activities. The deductive approach was primarily applied, aligning with Azungah (2018) for qualitative data, wherein themes from existing literature on digital literacy were established for initial coding. These themes, centred on Access, use, and ownership of technology, and Digital literacy, were cross-tabulated and diagrammed, guided by study objectives, research questions, and focus group discussions. Furthermore, an inductive analysis was conducted on the focus group discussion data, involving the identification, analysis, and reporting of common themes such as experiences, skills, practices, and student perceptions, as supported by Braun and Clarke (2006).

3.8 Trustworthiness and Quality of the Research

The researcher evaluated the quality of the work using concepts such as validity and trustworthiness. Regarding the validity of the study, it is important to mention that a substantial portion of the questionnaire questions were adopted from UCT's digital literacy programme. In addition, the focus group questions were adopted from previous research (such as Mayisela (2019) conducted in a similar context. The questionnaire's reliability and validity underwent thorough evaluation through pilot testing and statistical analysis, ensuring its accuracy in evaluating digital literacy gap. Construct validity was confirmed by assessing its alignment with intended constructs. Focus group recordings were transcribed, member checking was conducted for qualitative data analysis to validate interpretations and enhance credibility by ensuring participants' perceptions were accurately represented. This process strengthened the validity of qualitative data analysis, enhancing the overall trustworthiness of the research findings. In addition, verbatim is used to reduce researcher bias. It is important to note that the researcher translated the verbatim from IsiZulu to English in Chapter 4.

3.9 Ethics

Ethical conduct in this study adhered to UCT's Faculty of Humanities Guide to Research Ethics, with clearance obtained from UCT School of Education Research Ethics Committee and the UoT Research Ethics Committee. Informed consent was secured from all participants, who received both verbal and written explanations of the study's aim and purpose. Participants were assured the opportunity to withdraw at any time and that participation would be entirely voluntary (see Appendix 3).

Data security, confidentiality, and anonymity were maintained, following the researcher's data management plan (see the data management plan: https://dmp.lib.uct.ac.za/plans/3696). Participants remained anonymous, and pseudonyms were used when quoting direct

responses. A confidentiality agreement was established, with participants consenting to keep focus group discussions confidential (see Appendix 4).

Handling sensitive material and maintaining confidentiality, as advised by Baez (2002), was a key ethical consideration, addressed by obtaining participants' consent to keep discussions confidential. The researcher's positionality, as one providing technology-enhanced educational services at the university, was acknowledged. The researcher aimed to guide participants on digital literacy without influencing their responses and ensured any issues beyond digital literacy were appropriately directed to service departments.

3.10 Limitations of the Study

When evaluating the findings, it was important to consider the limitations of the study. Student competing schedules, it was challenging to have regular meetings and limited understanding of how Web 2.0 apps continue to be used after training. Some interested students did not attend focus groups, resulting in a reduced participant pool (ending up with27 participants). The timing of the research, during a busy semester altered by COVID-19 effects, limited the researcher's ability to dedicate extensive time to digital literacy training. Over the course of two weeks, a digital literacy course was delivered, potentially affecting student participation and responses in focus groups.

The framing of focus group questions in English led to code-switching among students who were more comfortable using both English and IsiZulu informally. Students demonstrated a shift in demeanour, becoming reserved and cautious, particularly when speaking English during recording. Despite assurances that their responses would not impact their grades, students remained hesitant and generally preferred to reply in isiZulu, explaining that they found it challenging to express themselves effectively in English.

3.11 Summary

In this chapter, the researcher presented a complete overview of the data analysis approaches adopted for this study. The chapter included a detailed review of the research orientation, providing an overview of the methodologies adopted to analyse data from the participants in this study. Additionally, the chapter offered a thorough description of the approaches and methods used for data analysis, leading to the generation of important and meaningful findings Lastly, the chapter further focused on the methods adopted to protect the study's integrity and its importance of trustworthiness. Ethical aspects were thoroughly explored, with a focus on the ethical principles adhered to in the research.

CHAPTER 4: FINDINGS AND DISCUSSION

4.1 Introduction

The findings of the current study show the effectiveness of utilising Web 2.0 applications, such as blogs, YouTube, and discussion forums, in enhancing the acquisition of digital literacy among first-year students at a University of Technology (UoT) in South Africa. These specific Web 2.0 apps were selected because they are asynchronous communication tools embedded into the university LMS. Through the analysis of data collected during the study, it became evident that the integration of these tools facilitated active engagement, collaboration, and knowledge sharing among students. Additionally, the findings showed that students acquired digital literacy after the training, including technical skills, effective digital communication, critical thinking, information searching and evaluation skills, teamwork and collaboration, and social skills.

To fully address the study objectives, this methodology created a cogent framework, using the research question below:

What is the role of Web 2.0 applications in the acquisition of digital literacy by first-year students at a South African UoT?

This overarching question served as a guide for the study, allowing exploration of more specific aspects that were subsequently broken down into sub-questions, leading to a deeper understanding of the subject matter. This structured approach continued with the following research questions:

- What are the digital literacy needs of first-year students enrolling at the UoT?
- How have the Web 2.0 applications used in the digital literacy course facilitated students' acquisition of digital literacy?
- What are the student perceptions about the use of Web 2.0 applications within the digital literacy course in facilitating their acquisition of digital literacy?

In total, 275 questionnaire responses were analysed and formed the basis of the discussion. For this quantitative data, bar charts and tables are used to present the findings produced through descriptive statistics. For qualitative data, themes are presented together with verbatim from the focus group participants. Strategically layering the research questions gave the researcher a way to arrange the presentation of findings in a systematic approach. First-year engineering students at the UoT were identified to have basic digital literacy needs, and

this led to research on the practical effects of Web 2.0 applications embedded in the LMS on the skill development of first-year Engineering students. Ultimately, the study delved into understanding the students' perceptions of how these applications effectively develop digital literacy. Ng's framework is used to present the findings with respect to the three digital literacy dimensions: technical, cognitive, and social-emotional. Furthermore, Martin's digital literacy framework was used for demonstrating students' digital literacy development in terms of digital competence and usage.

4.2 Digital Literacy Needs of First-year Student's Enrolled at the UoT

This section reports on data related to student demographic information, access to technology, its ownership and use, and digital literacy. This aimed to establish the digital literacy needs of students upon their enrolment at the university during their first year as these involve a various selection of digital literacy critical for their learning at university. Digital competence necessitates the integration of multiple skills and competences, encompassing aspects like creativity, technical prowess, information management, e-safety awareness, effective communication, information retrieval and assessment, collaborative capabilities, cultural and social awareness as well as critical thinking, evaluative skills, and adeptness in problem-solving (Van Laar et al., 2017).

4.2.1 Student demographics and digital literacy needs

Demographic data, such as gender, age, faculty in which students are enrolled, types of high schools attended by students, fee payer and first-generation university students (or not) were solicited. The last three elements assisted in understanding the socio-economic background of the students and assisted the researcher in tailoring the digital literacy course to meet their specific needs. The South African education system includes three main types of high schools: public, private, and alternative learning schools, along with home schooling, each with its unique educational model or curriculum. The assumption is that those students from public school are less prepared in terms of digital literacy than those from private schools. The same thinking goes with the fee payer and those who are first generation university students meaning their parents do not have post-secondary qualifications leading to them not having money to pay for private schools and university tuitions. By the same tokens they would not have money to buy devices. This suggests that a student's socio-economic status could influence their digital literacy.

4.2.1.1 High school attended by students

When students were asked which type of high school they attended before enrolling at the university, the majority (95%, N=261 or) indicated that they attended a public high school (Figure 4.1).

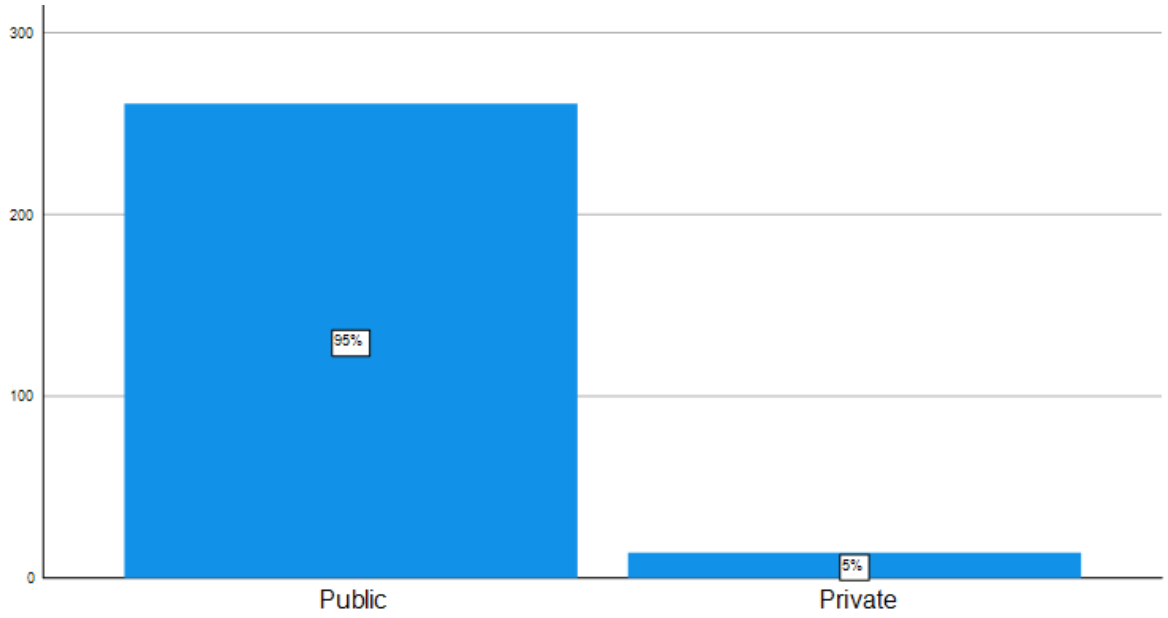

Figure 4.1: High schools attended

When participants were asked about the frequency of technology use while at high school, their responses demonstrated that 62% never used a desktop computer (which is a device that is predominantly used at school) and the majority of them never used portable devices too.

Table 4.1: Frequency of technology use

	Never	Daily	Weekly	Fortnight	Monthly
Use and how frequency of smartphone	10%	74%	8%	1%	6%
Use and how frequency of desktop computer	62%	6%	18%	4%	10%
Use and how frequency of laptop computer	59%	16%	11%	5%	9%
Use and how frequency of handheld computer	77%	13%	5%	1%	4%
Use and how frequency of game console	77%	5%	5%	3%	9%
Use and how frequency of digital camera	73%	8%	8%	7%	5%

Use and how frequency of video camera	71%	9%	12%	3%	5%
Use and how frequency of other devices	72%	12%	5%	4%	8%

These findings indicate that a significant number of students came from socio-economically disadvantaged areas with limited exposure to digital technology at the public high schools (see Appendix 7 for details). The digital divide between students from public and private high schools is clear, which has an impact on their preparedness for the digital demands of university-level education and digital literacy practices as discussed in Section 4.3. These findings are in line with literature on digital literacy in higher education, by authors such as Lee Shong (2020), who highlights the challenges faced by students from disadvantaged backgrounds in adapting to academic digital standards due to limited exposure to educational digital tools during their early years.

4.2.1.2 First-generation university student or not and fee payer

A person who is the first in their family to enrol in university is known as a first-generation student. This term emphasises the importance of families in shaping students' educational ambitions and outcomes. The participants were given the option to select any one of five types: I will be the first, the brother (stepbrother), the sister (stepsister), the mother (stepmother) or guardian, or the father (stepfather).

The findings showed that 56% of the participants were first-generation students, while 44% of them were not (Table 4.2).

Table 4.2: First-generation students and Fee payer

	Who pays tuition fees					
Family graduated before	**Father**	**Mother**	**Siblings**	**NSFAS**	**Bursary**	**Other scholarship**
None, I will be the first	13	22	6	110	1	3
Father (Stepfather)/Guardian	3	0	0	9	1	0
Mother (Stepmother)/Guardian	2	8	0	15	0	2
Brother (Stepbrother)	1	3	1	13	0	2
Sister (Stepsister)	3	1	0	31	0	1
Other	2	6	0	16	0	0

The findings from the questionnaire responses indicate that more than half of the participants (56%) were first-generation students. Coupled with fee payer, the finding show that 71% of the participants depended on support from National Student Financial Aid Scheme (NSFAS), which shows that majority of the participants are from a disadvantaged socio-economic

background. The above show a clear relationship between socio-economic background, lack of access to technology, and digital competence.

In summary of the above findings, the fact that many of these students were the first in their families to attend university and had limited exposure to technology at both high school and home suggests a potential barrier to their digital literacy development. This lack of prior experience with technology could impact students' ability to effectively utilise digital tools in their academic pursuits. Therefore, while it's not the sole determinant, it is a significant factor worth considering in understanding students' digital literacy levels and their readiness for technology-enhanced learning environments. Also, these students only encountered the necessity once they enrolled in a university whereas, they were expected to have a certain level of computer competence. Furthermore, their eligibility for financial assistance from the NSFAS because of schools they attended and NSFAS used a proxy for socioeconomic inequalities, further emphasising the need for targeted interventions to bridge the digital literacy gap and promote equitable access to education. This aligns with previous research by Van Laar et al. (2017), which emphasises that students from socioeconomically disadvantaged backgrounds are more likely to lack digital competence, including skills such as technical know-how, information management, e-safety awareness, effective communication, collaborative capabilities, critical thinking, and evaluative skills. As expected, the socio-economic challenges continued to resurface at university in term of student's device ownership.

4.2.1.3 Students socio-economic background and ownership of technological devices used for learning at university

Although the UoT claimed that the current infrastructure sufficiently satisfied the demands of the students, the research suggested that student ownership of devices plays a vital part in this process. Cardona (2018) argue that personal devices empower students to engage with online resources independently, contributing to enhanced digital literacy and academic development. Similarly, Johnson (2017) suggests that equitable access to personal devices promotes autonomy and accountability in students' academic success, which promotes a more inclusive learning environment.

The findings presented in Table 4.3 provide insights into the various devices used by participants to access the internet. When students were asked about the ownership of the devices, they most frequently used to access the Internet, students provided their responses. The data showed that the majority of the students (92%, N=260) used laptops followed by desktops (93%, N=255), tablets (71%, N=196) and iPads (67%, N=185) these devices were

owned by students and desktops that the participants used were primarily owned by the university. Most participants who made use of laptops connected to the university's Wi-fi while on campus. For those residing off-campus in private residences, they accessed the institution's Wi-fi (84%, N = 231), and when at home, they utilised mobile data (57%, N = 157) provided by the university and 47% (N=130) of the participants used their private mobile data to connect to the internet (Table 4.3).

Table 4.3: Devices used to access the Internet

Owner of the technology	**Me**	**University**	**Public library**	**Internet café**	**Cafeteria/restaurant/ shopping mall**	**Family member or friend**	**Other**	**N/A**
Laptop computer	74	100	14	13	2	56	1	22
Desktop computer	15	198	13	15	_____	13	1	27
Tablet	41	29	12	9	6	94	5	86
iPad	27	27	15	19	7	87	3	97
Wi-fi hotspot	22	231	5	4	_____	9	3	8
Mobile data (3G/4G)	108	157	5	1	1	3	2	5
Other (specify):	103	48	6	7	5	30	9	74

The study's analysis of device ownership and internet access among on-campus and off-campus students showed a significant digital divide, particularly affecting students from low-income or rural backgrounds. Off-campus students faced challenges in accessing essential technological resources, affecting their ability to engage with online learning materials, conducting research and participate in digital practice (see Appendix 8). These findings echo a broader discussion on digital inequalities in higher education. Previous research by Smith et al. (2019) highlights the impact of socio-economic disparities on digital access, highlighting the need for targeted interventions to bridge the digital divide among university students. Additionally, García-Peñalvo and Marín-Díaz (2020) emphasises the role of institutional support in addressing access disparities, recommending proactive strategies to enhance digital inclusion and promote equitable opportunities for all students. Consequently, addressing these inequalities in access to resources is crucial to promoting equal opportunities for all students in developing their digital literacy.

To mitigate the challenges identified, the study proposes proactive steps for higher education institutions (HEIs) to bridge the digital literacy gap among first-year students. Leveraging on funding programmes such as NSFAS to provide laptops for students, similar to the successful projects implemented during the COVID-19 pandemic, demonstrates the possibility of directed interventions in enhancing digital access and literacy. These recommendations are in line with the larger conversation on digital inclusion in higher education. García-Cabrero et al. (2021) advocate for collaborative efforts between educational institutions and external stakeholders to improve internet infrastructure and increase technology access for marginalised student populations.

4.3 Student Digital Literacy Practices and Digital Literacy Needs

It was crucial to determine the digital literacy practices in the technical dimension (including Web 2.0 students used), while in high school and at the beginning of the university semester.

4.3.1 Practices in the technical dimension

This finding showed that a large number of students had little to no exposure to technology devices, such as computers (including desktops, laptops, and portable devices) and other digital technologies like video game consoles, digital cameras, and video recorders during their time in high school.

4.3.1.1 Use of smartphones learning and personal purposes

The findings showed that most students (74%) used smartphones every day (see Appendix 11) while studying in high school and 78% of them used the smartphones for both learning and personal purposes, as shown in Figure 4.2 below.

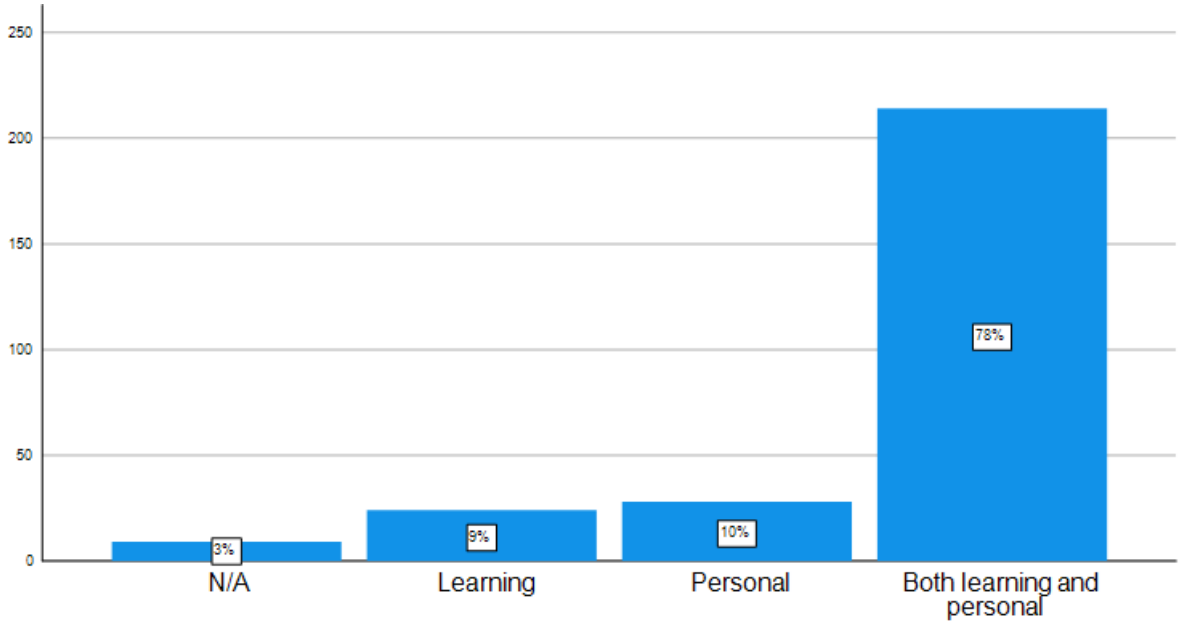

Figure 4.2: Purpose for use of smartphones in high school

In the current study, smartphones emerged as a prevalent tool for both personal and learning purposes, with a significant majority (78%) of participants indicating their usage for these activities. The statistics from my study indicate that smartphones are integral tools for students, with many using them daily for various activities, including academic activities (see Appendix 10). Similar to the current study, Mella-Norambuena et al. (2021) noted a high adoption rate of smartphones among students, with a substantial percentage of them using smart phones daily for both learning and personal purposes. This frequency in usage of smartphones highlights the high adoption of smartphones as educational tools. However, the 3% of students might still struggle with technical use of smartphones at university. Observations revealed techno-cognitive skills, such as competence in using smartphone to access Google search engine for academic information retrieval, and demonstrated collaborative abilities, reflecting a combination of cognitive and social-emotional skills when working with other students on academic activities.

4.3.1.2 Use of computers in high school for learning purposes

During the focus groups, when asked if they had access to a computer lab in high school, most participants answered they did not, as in the vignette below.

> Student: No. [Student 1 and the rest of the group concurred using their heads]
>
> Researcher: Okay. Also, did you make use of them? If not, why? If yes, for what did you use the computers? (e.g., typing assignments, completing projects, applying to tertiary institutions, etc).
>
> Student: No. [Student 1 and the rest of the group concurred using their heads]
>
> Researcher: So that means you did not use computers because you did not have them, right?
>
> Student: Yes, because only students registered for CAT programme were allowed to access the computer lab.

One respondent mentioned that they were not allowed to use computer in their school's computer lab, which was exclusive to participants enrolled in the Computer Applications Technology (CAT) programme. Furthermore, the restricted access to computer labs described by students adheres with findings by Mayisela et al. (2019) on the importance of integrating discipline-specific digital literacy into the curriculum. The exclusivity of computer lab access to certain subject programs, as observed in the CAT programme, reflects evident challenges in equitable digital education provision. Students also mentioned that in their high school computer labs, computer usage was typically restricted to those with special permissions where they use the computers for tasks such as completing assignments and submitting university applications. This lack of preparation often manifests in restricted access to computer labs and limited opportunities to engage with technology beyond basic individual use.

One student also reported that their school made use of tablets that were donated by the Siyafunda Community Technology Centre organisation. The donation of tablets by external organizations, as mentioned by students, highlights the role of external partnerships in bridging digital divides in high school settings. Nedungadi et al. (2018) demonstrated the effectiveness of mobile learning techniques in developing digital literacy among disadvantaged communities, emphasising the importance of innovative approaches to digital education. One of these students elaborated providing additional information, explaining that they had personal experience: "Minake kwakusetshenziswa amaSlides and nama projectors but not really that much", meaning "In my personal experience, in our school, the educator occasionally used slides and projectors, but it was not very extensive."

> Student: Kwakusetshenziswa amaTablets that were donated by an organisation called Siyafunda, if I am not mistaken [At our high school, we used tablets provided through a donation from an organisation known as Siyafunda].
>
> Researcher: So, did you have access to those devices?
>
> Student: Yes, but kwakuba into yaOnce or twice a week [Yes, we would use it once or twice a week].

As a result of these discussions with students, it became evident that a very small number students arrived at the university with a foundation in digital literacy; however, they still lacked the competence to actively use technology for effective learning. The focus groups revealed that educators did not provide formal teaching on how to use computers for learning, which adds to the gap in students' digital literacy. This emphasises how urgently all students must receive a tailored intervention and training in digital literacy that is student-centered to close the gap and ensure that they are all ready for the technological demands of higher education.

4.3.1.3 Other technologies used in the classroom

In response to a question about the educational technology used by educators and its effect on student learning, participants indicated that projectors were among the most used tools.

Further clarification came from one student who stated:

> Student: Well, thina esikoleni we had whiteboard uthishi ubexhuma laptop yakhe mese eyabhala [whiteboards were used in our classrooms, and educators would write on them using a laptop that was connected to the whiteboard].

When asked how technology helped them in their studies, one participant responded:

> Student: It was exciting to see the educator using the smartboard and how they can write using the technology.

Moreover, students mentioned that the use of smartboard contributed significantly to the enhancement of visual quality in presentations. This improvement positively influenced students' learning experiences, developing better understanding, and remembering essential concepts. Furthermore, they were asked to explain how they used technology (if at all) to interact with their educators. Out of 27 participants, three of the participants reported that they used smartphones to interact with their educators. One student elaborated:

> Student: During lockdown so think most of us suwu-grade 12 weCOVID (we are COVID grade 12s) so othisha babejwayele ukusenda amaVideos or previous papers on WhatsApp [the educator would send us videos and old papers via WhatsApp], so we communicated kanjaloke. So sifunda ngawo amafoni [consequently, that is how we used to communicate, and we learnt through WhatsApp utilising our mobile devices].

The above extract makes it clear that a few of the participants used WhatsApp for learning during lockdown for merely receiving videos and old exam question papers, meaning that there were no interaction between students and educators. This implies that a few of these focus group participants may have technical skills of using smartphones and WhatsApp but lack social-emotional literacy. Budianto and Yudhi (2021) highlighted how WhatsApp can be effectively used as a primary tool for teaching and learning, rather than just a supplementary one. Similarly, Dahdal (2020) found that students showed higher engagement when WhatsApp was integrated into their assignments, supporting the idea of using WhatsApp for teaching and learning purposes.

4.3.2 Practices in the social-emotional dimension

It was important for this study, to ask students about their confidence to communicate, collaborate, share, and connect with others in online spaces, so that the training could focus on the gaps. When participating in online spaces is important for university students to uphold authority over their online reputations. To protect their academic prospects and professionalism, before students upload anything publicly online, they should ensure that their public posts do not pose any risks on how they represent themselves. When they were asked how confident they were in using social media (such as Facebook, TikTok and Twitter) as a learning tool, 24% of students said they had never used it, 21% said they were somewhat confident in using it but needed more training, and 55% of them indicated that they were confident in using social media to enhance learning.

This is illustrated in Figure 4.3 below.

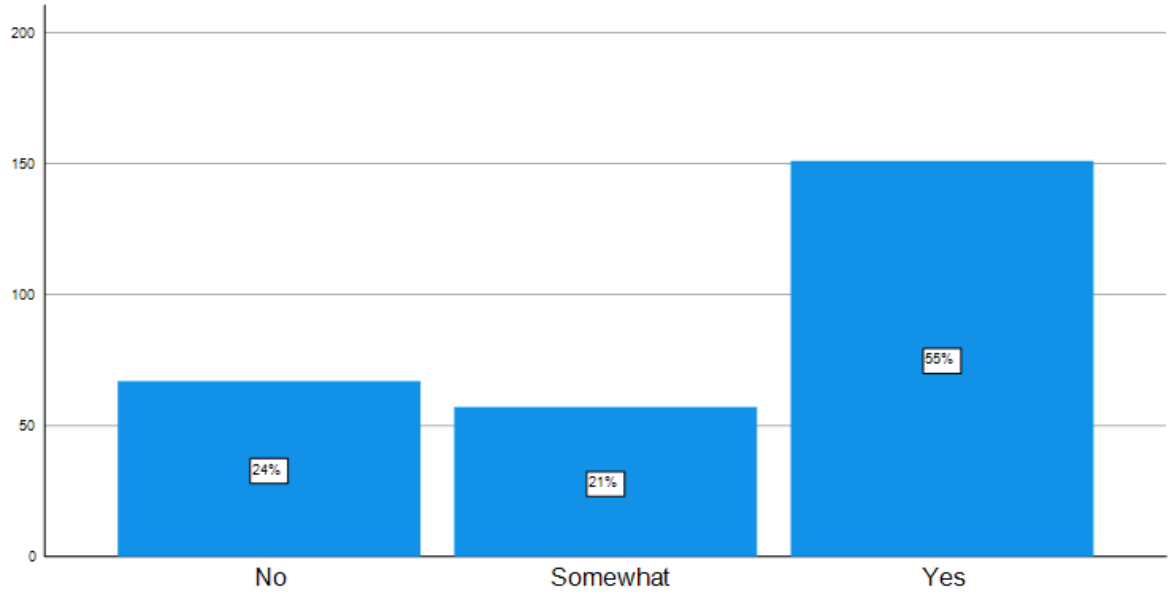

Figure 4.3: Confidence in using social media as a learning tool

The findings reveal that 45% of the students need to be trained on how to use social media effectively for their learning. Basitere and Mapatagane (2018) concluded that UoT Engineering students were required to use social media to promote engagement and collaboration. Ng's stated it must be part of the course when developing students' skills in the social-emotional dimension.

Research highlights the usefulness of instant messaging such WhatsApp and Telegram as a learning tool, which is reflected in the use of these applications for communication in classroom context. Misaghi (2021) found that WhatsApp enhanced student integration and motivation in distance education within the course, which enhanced student engagement, emphasising its potential to improve student-teacher interaction, student-student collaboration, and overall openness within the educational environment. This approach fosters increased interest in the subjects being taught as well as higher levels of connectedness among students.

When asked if they are confident in using instant messaging as a learning tool, findings showed that majority of the students (73%) of them indicated that they were confident in using instant messaging (e.g., WhatsApp, Telegram, etc.) as a learning tool (Figure 4.4).

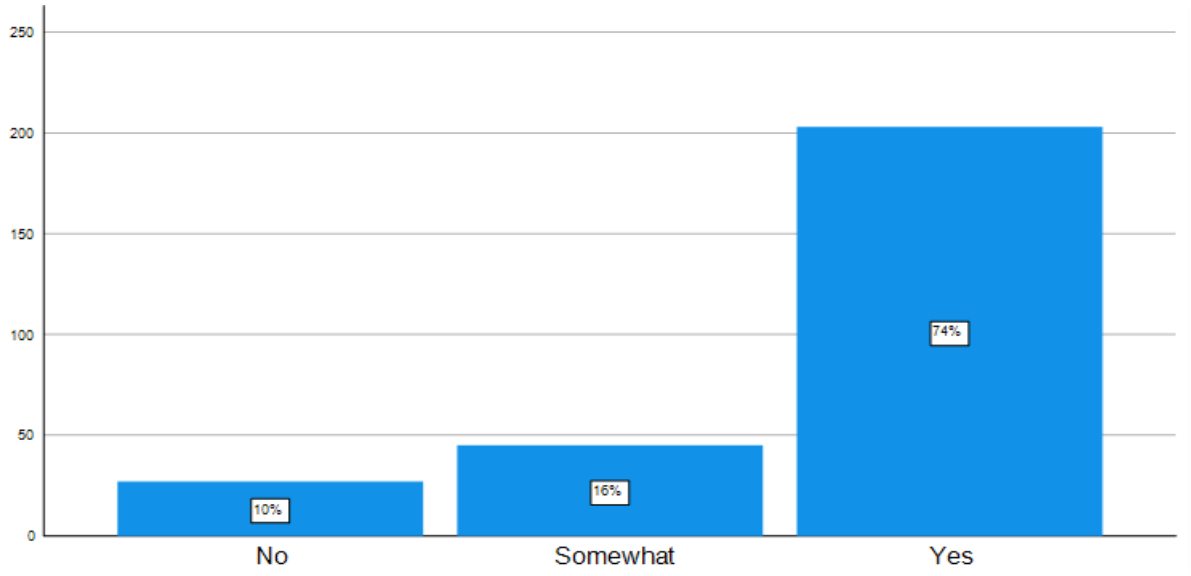

Figure 4.4: Confidence in using instant messaging as a learning tool

The data analysis showed that, 10% of students responded that they do not have confident with the tool, 16% indicated they were somewhat confident in using it but need to effectively use the tool for learning and the remaining 73% said they of them indicated that they were confident in using it as a learning tool. These findings align with the work of Lordache, Mariën, and Baelden (2017), who emphasised the importance of digital communication skills in academic context, which enable communication between students-students and students and teacher for active learning.

While many students reported using social media and instant messaging as learning tool, there were still noticeable challenges when it came to using these tools for collaborative learning activities. This emphasises how crucial cognitive skills such as critical thinking and problem-solving in effectively leveraging online spaces for educational purposes. Students' indecision to engage in discussions or share information on Web 2.0 applications (embedded with the LMS) may be the result of lack of confidence in their digital literacy skills, indicating a need for interventions aimed at enhancing cognitive competencies related to online communication and collaboration. This aligns with discussions around the development of comprehensive digital competencies in higher education (Kaeophanuek, Na-Songkhla & Nilsook, 2018) and emphasise the importance of tailored interventions to bridge cognitive gaps and foster critical thinking skills essential for academic success in higher education.

4.3.3 Practices in the cognitive dimension

The first-year students at the University of Technology were asked about their knowledge of search engines and navigating library systems, plagiarism, referencing and their capacity to create and share digital content.

4.3.3.1 Knowledge of search engines and navigate the university library system to find academic information

This section presents data regarding the utilisation of search engines and the university library system among students for academic information. It measures the effectiveness of these tools in helping students find resources for their studies within the context of their academic activities. The available options include Google, Google Scholar, catalogue, databases, e-journals repository, digital collections, electronic theses and dissertations and eBooks.

One of the objectives of the study was to establish whether or not students have the digital literacy needed to search for, evaluate, organize, use, and share information in all of its forms, particularly when coming to decisions, solving out difficulties, or acquiring new information. Findings showed that students could distinguish between material obtained from university libraries and that obtained from search engines (Figure 4.5).

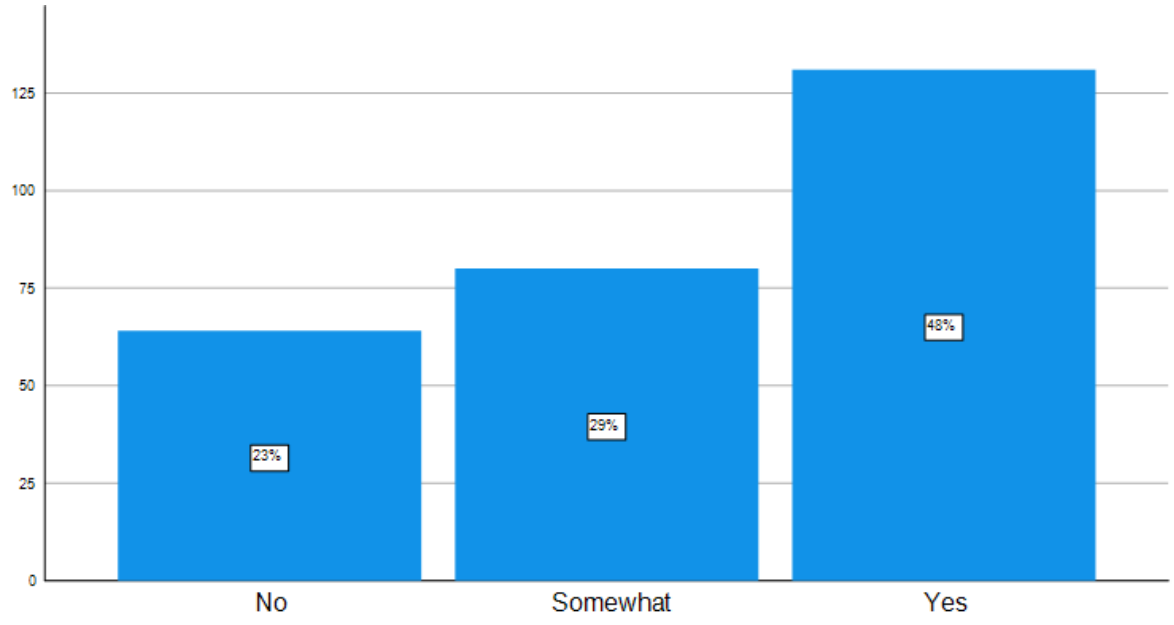

Figure 4.5: Confidence in using search engines and library system

When it came to using information resources, (48%, N = 131) of students reported that they were fully competent and indicated that they were confident in using it within the context of their studies, 29% of students reported that they were somewhat confident in but need

additional training, and 23% of students indicated that they were not confident in differentiating the types of information that they found using search engines and that in the university library system. Based on observation these students used search engines like Google to search for information for their studies. This dependence on search engines such as Google, is consistent with more general trends observed in educational research. For example, Head and Eisenberg (2011) and Judd & Kennedy (2011) mentioned that Google is a primary resource for many students when conducting academic research or school projects, highlighting its popularity and ease of access. However, concerns have been raised regarding the quality and reliability of information obtained through search engines (Head & Eisenberg, 2011; Judd & Kennedy, 2011), emphasising the importance of developing students' critical evaluation skills.

Consequently, many students indicated a lack of competence in utilising these resources optimally, reflecting a gap in cognitive skills application within the educational context. Furthermore, the data suggests a need for tailored training and educational interventions to enhance students' utilisation of specialised academic resources such as catalogues, databases, electronic journals repositories, digital collections, electronic theses and dissertations, and eBooks (refer to Appendix 9). The fact that Google is so often used as the first tool to obtain information highlights the necessity of offering comprehensive training in digital literacy, which includes instruction in resource differentiation, critical evaluation skills, and the effective use of specific academic tools. By addressing these gaps through tailored interventions, institutions can foster students to leverage digital resources more effectively in their learning objectives.

4.3.3.2 Plagiarism in writing and use of text matching software

Investigating plagiarism in writing and other forms of content creation among students, the researcher considered the perspectives of university students on plagiarism, taking into consideration the academic writing, teaching, and learning that students have received and their prior encounters with text matching software.

The researcher asked participants whether they could explain what is meant by plagiarism and how confident they were at using text matching software.

The results showed that a high percentage (52%) of students could explain what plagiarism is (Figure 4.6).

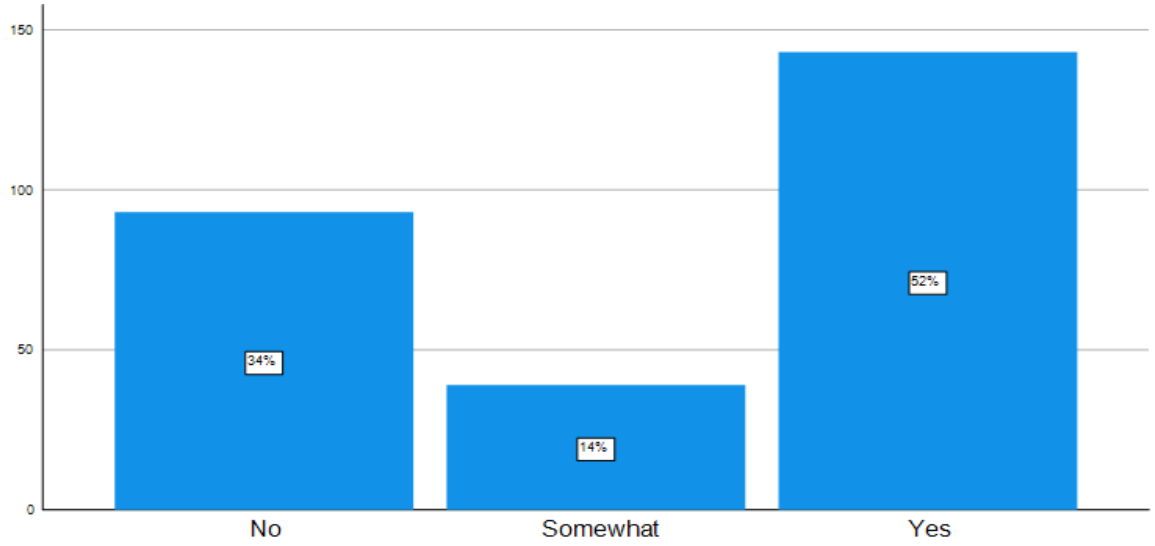

Figure 4.6: Confidence in explaining what is meant by plagiarism

The analysis of the data showed insightful findings concerning students' awareness and understanding of plagiarism. As per the outcomes, 52% of the participants could define plagiarism, signifying a moderate degree of acquaintance with the concept. Nevertheless, a considerable proportion of students (33%) unacknowledged to their inability to precisely define plagiarism, emphasising a substantial knowledge gap. These findings align with prior investigations conducted by Lofstrom and Kupila (2013), suggest that students are generally aware of the concept, but awareness of plagiarism alone may not be sufficient to prevent instances of academic misconduct. Furthermore, Lofstrom and Kupila's research highlights that students' awareness of plagiarism alone may not be sufficient to prevent instances of academic misconduct. Instead, they emphasise the importance of providing students with the necessary skills and training on how to avoid plagiarism and use text matching tools effectively.

Furthermore, only 14% of the participants indicated that they could somewhat define plagiarism, highlighting a gap in basic competencies and resources needed to effectively address academic integrity issues. This highlights the necessity for tailored interventions and educational initiatives aimed at providing students with practical approaches to upholding academic honesty. By addressing these gaps in knowledge and offering appropriate assistance, educators and institutions can enable students to maintain ethical standards in their academic activities and reduce instances of unintentional plagiarism.

It was also of interest to the researcher to ask students about text matching software (such as Turnitin, SafeAssign, and Grammarly) because they are important in the context of academic writing and competence. They are designed to analyse written text for similarities with existing content and provide suggestions for enhancing the originality and quality of writing. Regarding the utilisation of text matching software, the findings revealed that most students lacked experience in using these tools (Figure 4.7).

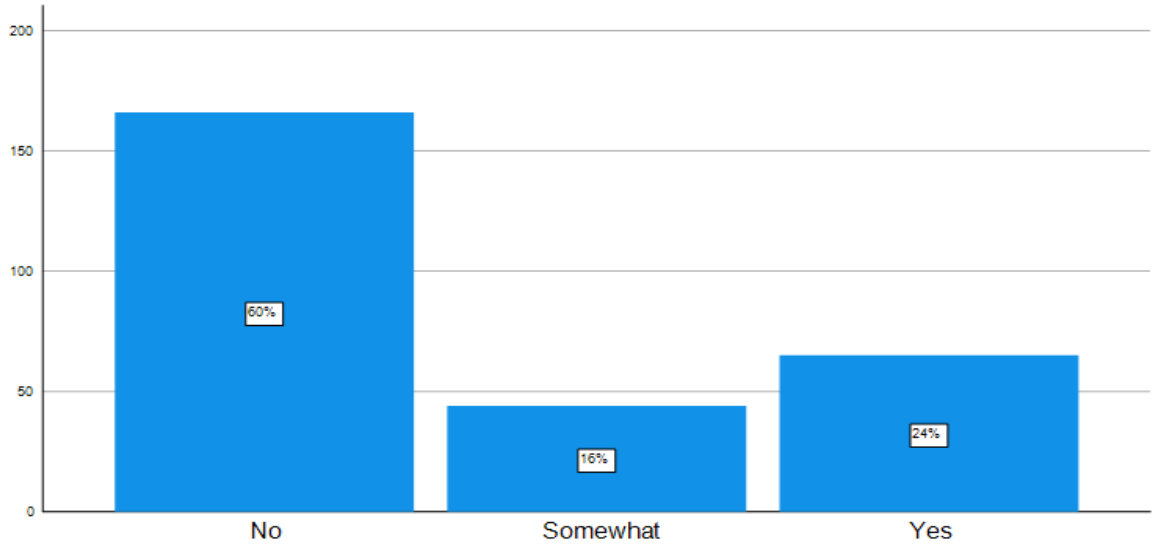

Figure 4.7: Confidence in using text matching software

The findings showed that 24% of participants stated their fully confidence in utilising text matching software. Additionally, 16% stated that they are somewhat confidence but expressed a need for further training. Importantly, the majority (60%) admitted to having little to no confident in using text matching software such as SafeAssign, Turnitin and Grammarly, attributing instances of plagiarism to this lack of knowledge. These findings suggest that a large number of students may engage in unintentional plagiarism due to not knowing how to properly reference, use text matching software and quality sources in academic writing.

The findings suggest that the integration of text matching software in an educational context presents a comprehensive strategy for promoting academic integrity and enhancing students' academic writing skills. By training students on how to effectively use these tools, educators can foster a culture of academic honesty and provide valuable feedback to help students enhance the originality and quality of their writing. This approach aligns with Dusza's (2020) perspective, which advocates for the integration of plagiarism detection tools as a means of promoting academic integrity and supporting students' development in academic writing. Equipping students with the necessary skills and knowledge on how to use text matching software could help avoid unintentional plagiarism and promote ethical writing practices.

4.3.3.3 Referencing

The findings from this research highlighted the importance of references in scholarly work, which is in line with the perspective presented by Madhusudhan (2016). Madhusudhan's (2016) exploration of the importance of citation in academic writing and referencing serve various functions in academic discourse, including acknowledging intellectual contributions, supporting claims with evidence, and facilitating deeper exploration of topics.

Findings showed a high percentage of students (60%, N = 165) who could not explain the rationale for referencing within the context of their studies (Figure 4.8).

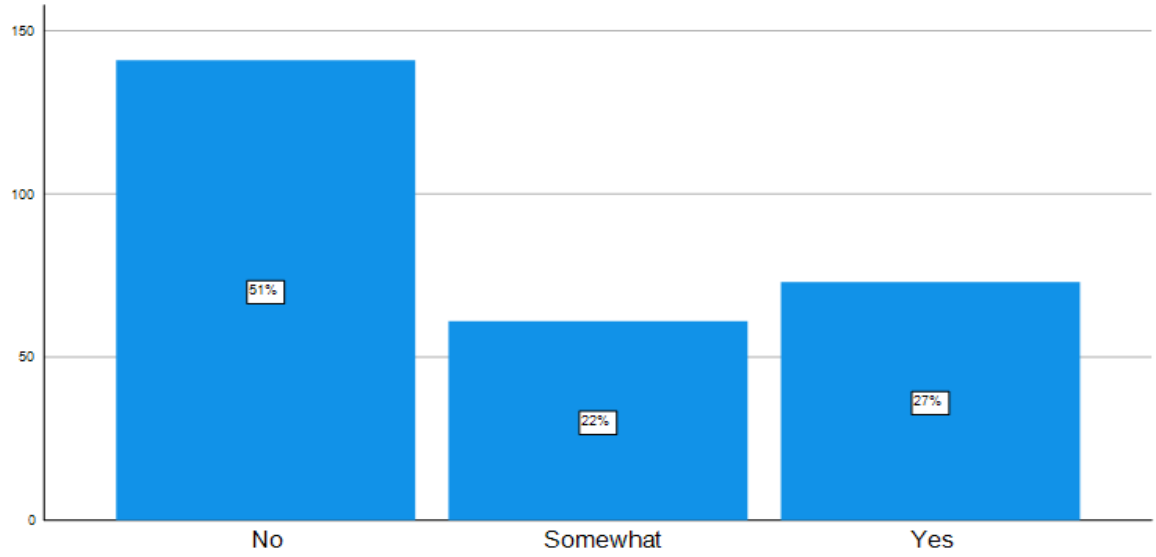

Figure 4.8: Confidence in explaining the rationale for referencing

Regarding referencing, 27% indicated that they were fully competent in explaining the rationale for referencing and could confidently apply it in the context of their studies. Another, 23% indicated that they are somewhat confident but needed further training. Notably, the highest proportion of 50% indicated that they do not have confidence in explaining the rationale for referencing. The findings suggest that these students were not taught how to use citation/referencing tools such as Endnote, Mendeley, etc at high school.

Overall, these findings align with Madhusudhan's (2016) perspective on the critical importance of rigorous referencing practices in academic writing. Moreover, referencing play a crucial role in establishing the credibility and authority of authors' arguments. To promote transparency, credibility, and intellectual integrity in academia, it is recommended that educators prioritize thorough citation and referencing practices in their academic activities, as supported by the findings presented below. The findings suggest that institutions must integrate comprehensive

referencing training into academic courses as their primary objective. Mayisela (2019), noted that this is a collaborative task between the library, writing centres and educators. Furthermore, by providing comprehensive training on text matching software and referencing formats can encourage students to engage more effectively in research dissemination and scholarly communication. By equipping students with the crucial skills needed to navigate referencing challenges, universities can foster an academic integrity culture and increase the standard of research output.

4.3.3.4 Student capacity to create and share digital content

Students were asked about their capacity to successfully create and share digital content with other individuals in a study context. The digital content included: pictures, text files, videos, blogs, and websites and creation and sharing included establishing the discussion's topic, referencing the argument made in the discussion, connecting assignments to in-class activities, and demonstrations by students on how to use interactive communications to support, encourage, provide feedback on, and generate new ideas with their classmates.

The findings showed that most of the participants (72%) reported that they could confidently create and share digital content within the context of their studies; 63% of students mostly created and shared text files within the context of their studies, 50% of students could not create and share blogs on the LMS within the context of their study and 41% of students could confidently create and share websites (Table 4.4).

Table 4.4: Creating and sharing digital content

Creating and sharing digital content	**No**	**Somewhat**	**Yes**
Pictures	13%	15%	72%
Text files	18%	19%	63%
Videos	14%	14%	72%
Blog	50%	28%	22%
Websites	33%	27%	41%

As a result of these findings, it was evident that there has been a limited transfer of personal and social practices into educational context. This could be attributed to the absence of a requirement or emphasis on creating or sharing content as part of the academic tasks or

coursework. In relation to the findings, it is rational to conclude that while students possess the background knowledge and experience to create and share digital content for personal use, they may be not equipped on to how it on their educational context.

Even though students had previously used social media for educational reasons throughout their time in high school, the findings from this study suggest that students lacked confidence in engaging on discussion forums or maintaining active blogs on the LMS due to fear of criticism, which mirror the social and emotional dimensions of digital literacy discussed by Ng's (2012). Where Ng's emphasise the importance of socio-emotional competencies alongside technical skills for effective participation in digital contexts. Furthermore, the observed hesitancy among students to fully utilise digital platforms for learning highlighted the need for comprehensive digital literacy training that addresses both technical competence and social-emotional readiness. Adopting a holistic approach is important for training students with these skills and necessary to navigate and succeed in increasingly digital learning contexts.

The following section present findings on students' digital literacy development after undertaking the digital literacy course that used Web'2.0 applications (chapter 3: section 3.6.2 Digital literacy course). In addition to Ng's framework, the next two sections (Section 4.4 and 4.5) present findings using Martin's (2008) framework of levels of digital literacy development: digital competence and digital usage.

4.4 Student Digital Competence after the digital literacy course

When focus group participants were asked about their digital literacy development, they reported having effectively acquired digital competences in the technical dimension, technical and social-emotional dimension, cognitive dimension and technical-cognitive dimension.

4.4.1 Acquisition of technical skills (technical dimension)

All 27 focus group participants reported that they had learnt how to: use a computer, use Microsoft Word, use an LMS (BB), and complete writing projects using Microsoft suite tools from watching YouTube videos. This was followed by 18 participants who reported that they learnt how to use student email and another one who went on to explain that he was comfortable with the computer login process, using student email to send and receive mail, and navigating the online library's website and catalogue. Students reported being able to use Microsoft Teams (MS Teams) for real-time collaboration and communication, attending classes, exchanging files, and sharing content, among other uses.

In addition, a student reported that they could now use the university's online library system that offers free access to reference materials such as eBooks, journals, newspapers, and encyclopaedias [Focus group 1, Student]. Moreover, they noted that they could always return to Blackboard to watch videos when needing to refresh their memory on navigating the library webpage. They also mentioned the convenience of revisiting Blackboard to watch videos whenever they needed a refresher on navigating the library's website. A student from the training said:

> I now know how to use MS Word and also, I know ukuthi I can use the laptop yami ndifumane MS Excel, another uses student email (I am competent in the usage of Microsoft Office, selecting appropriate tool that best fits purpose for particularly within the context of my course (e.g. Word and Excel), and can also send and receive emails as a student using the tools available on my laptop) [Focus group 3, Student 1].

These experiences are indicative of a wider pattern observed by Terenzini et al. (1996) and Lee Shong (2020), which emphasises how students from different backgrounds, including those considered to be digital natives, depend on accessible online resources to bridge gaps in digital literacy essential for academic success. Furthermore, this aligns with Ng's (2015) framework, which emphasis technical competencies required for navigating digital environments effectively. Because of this, more students asked for office consultations when they were having problems and required assistance, leading them to ask for demonstrations or explanations after training.

Furthermore, during the first focus group, students all agreed that the accessibility of Web 2.0 tools like YouTube made it easier to learn these new technical skills. Students reported that watching videos on YouTube was one of their best ways to acquire new material and enhance their digital literacy, including listening, using technological devices, communicate, evaluate, accessing online material and navigating online tools. In addition, they learnt how to make the most of YouTube as a teaching tool in the classroom (digital usage). For example, students used YouTube to get better explanations of difficult mathematical concepts they were trying to grasp by doing searches for relevant content. They acquired the technical skills to play, pause and rewind videos on YouTube, which promotes self-paced learning. This is consistent with Lankshear and Knobel's (2006) concept of multiliteracies, emphasising the intersection of technical skills with critical and creative practices in digital contexts. One student noted: "I had a variety of video options to select from, if I missed anything, I could always pause, rewind and watch it later."

> Student: Minake nje ngibone ukuthi YouTube uyasiza. … Ukwazi pause, ukubuyela emumva, uyakwazi nokubuka omunye umuntu and ukhethe ngoba baningi. …. Lomuntu wala esikoleni ufundisa iHour nalo ufundisa iHour but indlela achaza ngayo uyayiUnderstand kalula. Noma kungathi YouTube is useful but neEducator uyayidinga [As a student, I discovered YouTube to be amazingly useful because I could pause videos and resume watching later. Additionally, there are different YouTubers to choose from, allowing me as a student to find the one whose explanations I understand best. This is specifically advantageous because some university lectures can be quite lengthy, and the YouTubers often present the same material in a way that is easier to understand, and I can choose the one that suits me best from the available options. However, it is important to note that while YouTube is a valuable resource, educators are still needed because they provide guidance, direction, and structure for the content you need to learn] [Focus group 2, student 3]

Moreover, YouTube videos offer both auditory and visual support, making learning from them more enjoyable and practical than using textbooks. Finally, some students reported that integrating visual or auditory methods made learning easier for them.

Overall, these findings suggest a shift in educational dynamics, where educators can leverage students' self-directed learning preferences to focus on providing tailored support and structured content delivery (Ng, 2012; McLoughlin, 2011). The integration of YouTube into teaching practices is an example of how the pedagogical environment is changing in response to students' digital needs (Mayisela et al., 2019; and Smith & Storrs, 2023).

4.4.2 Acquisition of digital information finding (technical-cognitive dimension), evaluation and critical thinking skills (cognitive dimension)

Students who make regular use of digital resources like Google, Libraries, eBooks and Google Scholar do better in areas such as content acquisition, decision making, and plagiarism detection. Due to the requirement that each student submit a plagiarism declaration form with each essay, it is expected that all students in this course would be knowledgeable of how to avoid plagiarism. From watching videos on YouTube, students were able to acquire these different skills and follow instructions from the YouTube videos.

During the focus groups, one of the students reported that they acquired knowledge about ethical difficulties in writing such as plagiarism by watching videos on YouTube. Even though they would have liked to learn more practical information within the course content and apply it in the context of courses, they did report that they had acquired this knowledge during training. One of the students in the focus group said:

> I did some research and learnt a few things about plagiarism, but the information I just received was not particularly useful. Also, I was given an explanation of what constitutes plagiarism prior to beginning our training. By participating in training, however, I was able to acquire a better understanding of how to avoid plagiarising as well as how to search for and appropriately utilise learning materials to write assignments [Focus group 2, Student 2].

Another student reported that although he had received training on how to avoid plagiarism, he had not yet been given any tasks that would have required him to do so.

> We haven't been given ama-tasks andinga ukuthi research and stuff. So, the educator has never given us a task to experience or make use of what we have learnt during our training [Focus group 2, Student 3].

As the above discussion has shown, students need more hands-on experience with learning resources like text matching software in order to develop the cognitive skills that will allow them to succeed in higher education. McLoughlin (2011) emphasises that it is extremely important to continue developing students on digital literacy and other topics that are relevant to it. As one student put it:

> Student: ukusebenzisa izincwadi abanazo laphaya library kusizile kakhulu (watching YouTube helped me learn how to use eBooks from UoT's online library through the use of video components embedded on the blackboard LMS helped and allowed me to be creative and avoid plagiarism).

Furthermore, another student reported an improvement in his skill to think critically, the use of library tools and databases, the skill to search for information (using online library, eBooks, Google, and Google Scholar) and evaluate, organise, use, and communicate information in all its formats.

> Student: Yah (meaning yes) Being able to search for information and create presentations based on the information you got from Google and Google Scholar.

> Student: All right. So, ukusebenzisa izincwadi abanazo laphaya library (it's the use of ebooks) and being able to use that information.

The above excerpts show transformative impact of participating in the digital literacy training course, wherein students demonstrated newfound skills,such as searching for information, critically evaluate sources, and understand ethical and copyright concerns, meaning they could also assimilate and present information. Furthermore, students showcased enhanced capacities for critical thinking and self-reflection on their work.

Students also reported that in the process of using YouTube to learn mathematical concepts, they were now able to evaluate the content and determine the credibility of the presenters or YouTubers, and the correctness, ethics, timeliness, perspectives, and lack of objectivity because the information should be current (cognitive dimension).

Lastly, during the focus group two discussion, the researcher asked students if there was anything they would like to be further trained on. During the focus group discussion, one participant elaborated:

> Student: I read some information. I just learnt not much about plagiarism. The definition of plagiarism was explained to me before we even began our training by my educator. Very little new knowledge has been acquired by me. But from attending training I learnt how to not plagiarism and how to search for information and critically evaluate it, as well as an understanding of ethical and copyright issues and use it the right way [Focus group 2, Student 1].

Overall, the process of plagiarism and content creation is mediated by a wide variety of interconnected activities, as was revealed by the earlier indications of various technical and conceptual methods. They range from the technical (typing, formatting, and the like) through the techno-cognitive (using the Internet to locate information) to the cognitive (researching, synthesising, integrating, and presenting knowledge by paraphrasing, developing an argument, and citing) that students learnt these through watching videos on YouTube embedded in the LMS.

4.4.3 Awareness and knowledge about communication channels (Technical and social-emotional dimension)

Students who took part in the study felt they had gotten better at communicating with others. Because WhatsApp and MS Teams were the only ways for educators to keep in communication with students, students had a deeper understanding of these platforms and were better able to share course materials and send timely notifications about important dates like exams and assignments. One student said:

> Student: Sisebenzisa uWhatsApp, the educator had restriction group yayivaliwe ukuthi ukwazi ukusenda ngasiphi isikhathi, kwakuthisha owaye kwazi ukusenda. Kwakukhona izikhathi mhlampe uthisha azokhipha umsebenzi ngesikhathi so that we can all access it [We used WhatsApp; the educator had restricted the group from being opened so that you could know when to send. It was a teacher who knew how to send. There were times when a teacher assigned work during class so that we could all access it] [Focus group 2, Student 3].

Furthermore, most students who took part in the focus groups said they were comfortable using MS Teams for meeting with other students and occasionally meeting to accomplish activities. In addition, through working together in WhatsApp groups, their digital communication, social skills, and group dynamics all improved greatly. The utilisation of communication tools such as WhatsApp and MS Teams, as described by the students, reflects the practical integration of digital tools into educational practices, aligning with the emphasis placed by Ng (2015) on the technical dimension of digital literacy. By becoming proficient in these tools, students not only enhanced their technical skills but also experienced improvements in social-emotional dimensions of communication, as highlighted by their skill to engage effectively with peers and educators.

One participant elaborated on how she had noticed an improvement in her communication skills after the digital literacy course.

> Student: Communication skills angithi? Singiyakwazi ukuxazulula izinking ekhaya and sengiyabalalela effective communication angithi Phakathi (asking another students), sengiyakwazi ukubabeka lah nalapha and ngiyabafundisa uku-communicator and kuyaziza ukuthi nabo bangazi kangcono ekhaya [I can now have meaningful conversations with my family members, address issues at home, and listen to them to figure out how to resolve problems. The fact that we are able to exchange ideas has also aided in their understanding of who I am] [Focus group 2, Student 4].

This excerpt demonstrates that this participant could better present herself online because of participating in the digital literacy course, this provides valuable perceptions into the transformative ability of digital literacy initiatives in higher education.

When students were asked about digital communication and social skills, one student mentioned:

> Student: Communication has significantly improved because our primary means of connecting with classmates' students is not only through WhatsApp but MS Teams. We use it to exchange information and share timely reminders or notifications about upcoming tests, assignment due dates, and other important events related to our subjects.

Regarding collaboration and teamwork, another student mentioned:

> Student: I can personally attest to the presence of collaboration and teamwork in our class. We are required to complete all assignments as a group, and I believe this develops a strong sense of collaboration. This sentiment was echoed by all the other students in the class.

This data emphasises the important role of the social-emotional dimension in the learning experiences of students in higher education. Through exchanging information with their classmates, students not only reinforce their understanding of the material but also enhance their critical thinking, effective communication, engagement, and attentive listening skills. These skills are important for academic success, and students can more effectively apply the knowledge they have acquired in practical situations. Engaging in discussions and communication with others, particularly on topics that interest them within their context of study, accelerates the learning process (Al-Huneidi & Schreurs, 2013).

These findings align with wider scholarly discussions on the importance of social-emotional skills in educational contexts (Al-Huneidi & Schreurs, 2013). Based on these findings, it is recommended that educators promote a diverse and active learning context that motivates students to actively participate and work together with their peers and enables them to make meaningful connections between their theoretical understanding and its real-world application. The inclusion of group activities, discussions, and collaborations in the curriculum can give students important chances to grow and improve their social-emotional skills. In addition, educators should emphasise the value of clear communication, critical thinking, and active listening throughout the learning process since these skills are crucial to students' academic progress and all-around improvement.

4.4.4 Acquisition of collaboration skills (Technical-cognitive dimension)

The students who were asked about their use of blogs and discussion forums for developing their collaborative skills reported they did not engage with the tools, meaning that they did not acquire any such skills through their use. This was mainly because they had to write in English, which is not their native language. They expressed that they felt more at ease speaking or writing in their native tongue hence, they refrained from participating in discussion forums and blogs. The students in this group had the misguided belief that the language they spoke was not being acknowledged, and as a result, they did not want to take part in the activity. One participant said: "Yes, because of the language issue. Ukubhala ngesingisi" (struggling to write in English).

Many South African students face a disadvantage as they are compelled to pursue education in a language that is not their mother tongue, a consequence of the country's colonial history. This perpetuates a monolingual norm, reinforcing the notion that English is superior, leading to social injustice and discriminatory impacts on student learning. aligns with research highlighting the discriminatory impacts of colonial language policies on student learning and

social justice (Hurst & Mona, 2017). Movements advocating for decolonising the curriculum, such as Rhodes Must Fall, emphasise the importance of addressing linguistic diversity and promoting translanguaging pedagogies in higher education. Hurst and Mona (2017) proposed a translanguaging pedagogy as a remedy, illustrating its application in a University of Cape Town first-year course in 2015 and 2016. Through examining educator perspectives, classroom practices, and assessments, they demonstrated the potential of translanguaging pedagogies in aiding students disadvantaged by English monolingualism. The current study therefore recommends that educators take into cognisance diversity of their students languages and allow for multilingualism when using the discussion forums and blogs embedded within the LMS.

In the researcher's experience, students who start learning in English as a second language often resort to code-switching because they have difficulty finding the appropriate English words and expressions to convey their meaning. Students code switch or language mix as a strategy for overcoming challenges/difficulties with sentence construction by taking advantage of the opportunities to use their native language or mother tongue (Makgato, 2014). This may be because students have a larger vocabulary in their original language and students learning happens in a second language, so they code switch to their native language because they feel comfortable.

The study recommends these the need for educators to adopt inclusive pedagogical practices that acknowledge and accommodate linguistic diversity within learning management systems (LMS) environments. By doing so, educators can create a more inclusive and accessible learning environment that caters to the linguistic needs of all students, regardless of their native language or proficiency level. Additionally, providing training and support to educators on how to effectively implement multilingual pedagogies within LMS platforms can further enhance their capacity to leverage these tools in a linguistically diverse classroom setting.

4.5 Student Digital Usage after the digital literacy course

The findings showed that students applied digital competences, such as Internet-based communication, collaboration tools and search tools that allow them to find, evaluate, store, create, display, and share the information in the courses.

4.5.1 Digital usage of communication skills

Participants reported using WhatsApp and MS Teams as their primary means of communicating and interacting with fellow students. This became increasingly relevant during

and after the COVID-19 pandemic and has been recorded both internationally and nationally (Nuuyoma, Mhlope & Chihururu, 2020). The study shows how students use digital communication skills, emphasising the use of technologies like MS Teams and WhatsApp as the primary tools for communication and interaction. WhatsApp appears to be a suitable communication medium to integrate within the setting of higher education courses and the maintenance of communities of practice among students and educators based on the discussion above. This is a crucial aspect that must be built into the digital literacy curriculum for first-year students.

4.5.2 Digital usage of collaboration skills

The participants mentioned that they worked together with other students using different platforms such as WhatsApp and Microsoft Teams. Higher-order cognitive activities including analysis, creativity, assessment, and problem-solving are all facilitated more effectively when students work together in the classroom. This aligns with previous literature emphasising the benefits of collaborative learning in educational context (Martin, 2008; Hwang, Zou & Wu, 2023). The development of interpersonal skills such as listening, understanding, communication, support, leadership, interaction, and argumentation can be facilitated using teamwork in the classroom. Students were given the opportunity to not only work together on the collection and evaluation of new information but also to share their findings with their classmates when the topic of teamwork was pedagogically addressed in the classroom.

One participant said:

> Student: I think our collaboration and teamwork has improved because everything that we have to do we do it in groups, so we communicate on WhatsApp [Focus group 2, Student 1].

Another participant reported that the educator had to force them as students to work together as teams. For instance, one of the group participants discussed how the concept of teamwork originated.

> Student: I do agree teamwork is there, but it is forced by the educator because it does not come from us as classmates [Focus group 2, Student 2].

The above excerpts show that all students, not only the participants, benefit from participating in team activities that encourage the development of crucial interpersonal and importance of task design by educators can prove beneficial to students both in and out of the classroom.

Furthermore, participants also reported that they were required to work together on every assignment, which necessitated the formation of teamwork to successfully complete the activities. In fact, MS Teams is the primary technology that the university uses for its online classes. Participants in the focus groups reported that there was a context conducive to teamwork and collaboration in their classes because they had to work together on all the assignments.

One of them said:

> Student: I think our collaboration and teamwork has improved because everything that we have to do we do in groups, so we communicate on WhatsApp [Focus group 2, Student 1].

However, participants reported that in all honesty, the only time they collaborated or worked together as a team was when the instructor instructed them to do so.

The preceding passage suggested that the ability to work in teams is present, even though it is forced. Students who wished to connect and collaborate using these tools (WhatsApp & MS Teams) to set up teamwork and collaboration from online discussions to meetings with other members of their group were able to do so easily thanks to training that made it easier for them to do so.

These findings indicate the continued use of these tools by the university, coupled with effective task design and improved scaffolding, which encompassing not only the technical aspects of tool usage but also broader instructional support and effective utilisation of the tools. Moreover, the wide use of tools such as MS Teams in online learning confirms the findings of studies on digital literacy development (Mayisela, Hodgkinson-Williams, & Brown, 2019). This highlights the need for universities to provide effective training and scaffolding to enhance students' technical competencies while fostering meaningful collaborative interactions (Hwang, Zou & Wu, 2023).

Based on these findings, universities should continue to use technology for collaboration, such as MS Teams, while focusing on teaching methods which promote true and voluntary teamwork among students. Training and support should be offered to educators as well as students to leverage the positive effects of digital collaboration tools in improving students' acquisition of basic competencies and creating dynamic learning environments.

The next section presents students' perception about the digital literacy course, in general and the use of Web 2.0 applications, to develop their digital literacy, in particular.

4.6 Students' Perceptions About the Digital Literacy Course in Developing their Digital Literacy

4.6.1. Student experiences and aspirations about the course

With respect to the perceptions of the 27 students who participated in the focus group, a significant majority expressed positive perceptions regarding their experience with digital literacy training and expressed that it was engaging, informative, helpful, and easily accessible. For instance, one student highlighted the programme's value in improving their skills to use the university's educational technology within the context of their coursework. Another student found the course beneficial primarily for the technical skills they acquired. Furthermore, a significant portion of these students concurred that the training was highly beneficial as it provided them with practical insights into effectively using tools such as MS Teams, BB, student email, and other pertinent digital resources.

When asked about the aspects of the training that were the least beneficial; students expressed dissatisfaction with the lack of grading attached to the training sessions, which they considered demotivating. Additionally, there was a consensus that the training was too short, covering content quickly within a limited timeframe. Many students suggested extending the training over a period of time, breaking it into sessions to allow for better understanding. One student emphasised the need for more in-depth sessions on Microsoft Excel and PowerPoint, crucial tools in their classes. The dissatisfaction with short training sessions and the desire for more in-depth exploration of specific tools like Microsoft Excel and PowerPoint mirrors existing research that advocates for tailored training programmes that address a range of skill levels and needs (Lee Shong, 2020). Additionally, students expressed a need for smaller group sizes to ensure individual attention and assistance from instructors when struggling to understand specific topics.

After being asked whether there was anything further, they would like to learn, many indicated interest in further training. Some common areas where students felt they needed more instruction included Microsoft Excel, citation and referencing practices, and Turnitin also reflects the evolving demands within higher education where digital literacy includes not only technical skills but also information management and academic integrity (Law et al., 2018). Integrating these aspects into digital literacy training aligns with the multidimensional framework proposed by Ng (2015) and highlights the necessity of continuous improvement and adaptation in digital literacy training. Additionally, students were also given the opportunity to offer suggestions (or recommendations) for improving the digital literacy training or to offer

any further feedback they might have. A common suggestion from students was to extend the length of the training so that they could more completely review the subject. Lastly, when asked if the course material was what they were expecting. There was a collective “yes” from the participants.

Overall, students' feedback highlighted the importance of integrating digital literacy into curriculum as advocated by different scholars (Mayisela et al., 2019; Mayisela, 2019). This integration ensures that digital literacy becomes a key component of students' academic journey, preparing them for success in today's technology-driven educational landscape.

4.6.2. Student perceptions about the use of Web 2.0 Applications in the course

The focus group discussions’ investigation into Web 2.0 applications revealed important new information on how they can improve digital literacy and transform the learning experience.

One noteworthy observation during my study was the overwhelmingly positive reception of Web 2.0 applications in the context of enhancing digital literacy within the classroom. What makes this observation especially intriguing is the overwhelmingly favourable perception that emerged from one of the students in Focus Group 1, who expressed an exceptionally favourable stance towards the use of Web 2.0 applications, describing it not simply as good, but genuinely and substantially beneficial.

What makes this perspective even more compelling is that it was not an isolated view. Instead, every student in the group concurred with Student positive evaluation of Web 2.0 applications. This collective agreement adds significant weight to the recommendation that Web 2.0 applications have a profoundly positive impact on enhancing digital literacy within the educational context.

They emphasised the pivotal role platforms like YouTube play in simplifying complex and often challenging subject matter, including mathematical and scientific concepts. These areas of study, which are traditionally considered difficult to grasp through conventional teaching methods alone, become more accessible and comprehensible through the dynamic and interactive nature of Web 2.0 applications. The focus group discussions showed an a widespread of positive acceptance of Web 2.0 applications, which was consistent with findings from several studies (Martin, 2008; Hsieh & Wu, 2017; Hwang, Zou & Wu, 2023). This positive perception aligns with the acknowledgment of Web 2.0 tools like YouTube as effective educational resources, simplifying complex subject matter and improving information retention.

Since YouTube modelled the best practices for learning new skills and improving information retention, students were able to learn and retain knowledge and developed specific skills – visual contexts helped students to easily gather knowledge about a subject being covered in a class and apply rational thinking to differentiate information that was relevant to the subject. Those who took part said they were in a position to make educated decisions about which educational YouTube videos to view for class. One focus group student reported that they watched YouTube videos frequently for effective learning:

> Student: Yes, YouTube siyawasebenzisa in order to learn izinto esingazizwanga eklasini. Kodwa mhlampe educator ibichaza here and there. Mhlampe ngicela ukubuza isikhathi Sir mhlampe uzithi it 15:20, YouTube will say mhlampe uzothi it 20 pass 3. Uyabona simple. [We use YouTube to learn concepts we didn't understand in class. The explanations provided by the YouTube educator or user are more understandable and useful, despite the fact that both of them educate for the same amount of time (one hour). Although both educators are speaking English, I don't know why I have such a hard time following the lecture].

The findings highlighted an important role of Web 2.0 applications, such as YouTube, in simplifying challenging subject matter and making it more accessible to students. Maphosa and Bhebhe (2019) emphasise the necessity of strong digital literacy for effective use of online learning materials, which resonates with the focus group's positive experiences with YouTube in mastering difficult concepts. The use of Web 2.0 applications like YouTube aligns with Martin's (2008) framework, which emphasises the practical application of digital competence in solving real-world problems. This excerpt that students had the opportunity to master difficult and abstract mathematical ideas in a way that was both entertaining and engaging by using YouTube. This observation highlights the importance of the cognitive dimension of digital literacy, emphasising the importance of cognitive skills such as understanding, analysing, and critical thinking.

By utilising Web 2.0 applications such as YouTube, students were not only exposed to visual contexts that aid in knowledge acquisition but also develop the skills to critically evaluate information and boost knowledge retention for learning. With Web 2.0 apps were well received by students this highlighted their effectiveness in facilitating digital literacy. Based on these findings, there is a strong recommendation to integrate Web 2.0 applications more systematically into educational practices, aligning with frameworks for digital literacy development discussed in the literature (Martin, 2008; Ng, 2015). This integration can enhance student engagement, knowledge acquisition, and digital competence, ultimately contributing to academic success and readiness for the digital age.

4.7 Summary of the Chapter

This chapter drew together the pedagogical advantages of Web 2.0 applications and students' perceptions within digital literacy course. Moreover, a detailed understanding of the intricate impacts of Web 2.0 applications on student learning experiences was facilitated by the analytical framework used in the study. This framework not only focused on the technical dimensions but also on the educational opportunities these tools offer in the classroom. By adopting this approach, students were able to enhance their digital competence by actively applying technological knowledge to solve problems and achieve academic objectives.

Additionally, the primary findings of this chapter emphasised the pedagogical advantages of integrating Web 2.0 applications to facilitate the acquisition of digital literacy. It emphasised the importance of purposeful integration beyond technological features to explore the educational possibilities of these application embedded in the LMS. The chapter highlighted how these applications such as YouTube can enhance the learning experience of first-year Engineering students, simplify complex subjects, and taking into account different learning styles, especially among underprepared students. Furthermore, the study demonstrated that integrating Web 2.0 applications into digital literacy education significantly contributed to students' acquisition of digital competence and enhanced their usage of digital tools within their academic studies. By leveraging Web 2.0 applications, educators can establish comprehensive, captivating, and efficient learning opportunities, aligning with a learner-focused, technology-enhanced teaching methodology.

Overall, the study emphasised the effectiveness of integrating Web 2.0 applications in digital literacy education to enhance students' acquisition of digital competence and usage of digital tools within their academic context. How students were able to acquire digital competence and enhance their usage of digital tools within their context of studies. Moreover, the findings emphasised the significance of recognising students' adapted perceptions and engagement patterns when integrating these technologies. Overall, these insights contribute significantly to the broader digital literacy training initiative, offering practical guidance for educators and institutions navigating the evolving landscape of technology-enhanced pedagogy.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions drawn from the study on the digital literacy needs and acquisition among first-year students enrolling at a University of Technology (UoT), along with recommendations for addressing these needs and enhancing digital competence among students. Although this study intended to research all first-year students, the researcher could only access the students registered in the second semester (i.e. when ethical clearance was granted), of whom the majority were Engineering students. This study aimed to explore the role of Web 2.0 applications in the development of digital literacy among first-year students at a South African UoT. This research study was framed by the following research sub-questions:

- What are the digital literacy needs of first-year students enrolling at one of the South African UoTs?
- How have the Web 2.0 applications used in the digital literacy course facilitated students' acquisition of digital literacy competences?
- What are the student perceptions about the use of Web 2.0 applications within the digital literacy course in facilitating their acquisition of digital literacy?

While the study aimed to investigate all first-year students, the researcher of this study could only access the students registered in the second semester (i.e. when ethical clearance was granted), of whom the majority were Engineering students. The previous chapter presented the findings and discussed the recurring themes that emerged from the study. This chapter draws on the study's findings to make recommendations about how to enhance digital literacy programmes and effectively integrate Web 2.0 applications in the educational context.

5.2 Digital Literacy Needs of First-year Students Enrolling at the UoT and how to potentially address them

Today's first-year students need to be able to do more than just search the web for information; they need to be able to create and maintain their own content and participate in online collaborative learning and more in order to learn effectively and make it in the working world. At enrolment, most students had little to no digital literacy and experience as a result of limited access to computers and use of technology for learning prior to university. The study identified a strong link between limited digital literacy and students who had previously attended public high schools as well as those who were first-generation university students, implying that socioeconomic factors can indeed impact a student's level of digital literacy. However, an

intriguing finding emerged when considering a small percentage of students who had used smartphones for learning during their high school years. This subgroup displayed a distinct trend, suggesting that skills associated with the technical dimension of digital literacy are more readily transferable. This observation may be attributed to the similarities in functionality between smartphones and computers, making certain digital literacy more adaptable.

Furthermore, the research identified several critical digital literacies needs among first-year students at the University of Technology. These needs include competence in using digital tools for academic purposes, understanding digital information literacy, and navigating online learning platforms effectively. Indah et al. (2022) suggested integrating interdisciplinary projects that encourage collaboration across different academic disciplines, thus promoting the integration of digital skills into various fields of study. To address these needs, it is recommended to implement a tailored digital literacy orientation programme for incoming first-year students, offer workshops and tutorials focusing on essential digital skills, and provide ongoing support through embedded digital literacy modules within relevant courses.

Lastly, based on the findings it is recommended that educators promote a diverse and active learning context that motivates students to actively participate and teamwork. Furthermore, encouraging educators to create dynamic learning environments that promote active participation and peer collaboration is recommended (Garriott, 2020). By integrating group activities, discussions, and collaborative projects into curriculum, educators can provide students with valuable opportunities to develop and enhance their social-emotional competencies, thereby facilitating their academic growth and holistic development.

5.3 Students' Acquisition of Digital Competence and Digital Usage

The focus of this research has been on the level to which students have acquired competence in both digital competence and digital usage skills. Martin's (2008) perspective underlines that the combination of digital competence and usage is adequate to identify an individual as digitally literate.

This research recommends that higher education must continue the integration and exploration of Web 2.0 applications such as YouTube within the educational context. In addition, the effective use of Blackboard LMS, used in combination with these technologies, may also greatly improve the learning experience. Educators are encouraged to connect their pedagogical practices with the changing requirements of modern education and to maximise the benefits of digital competence and usage. Taking such calculated steps might help

universities develop graduates who can successfully navigate the ever-changing digital environment of today and the future.

5.3.1 Digital Competence

The study emphasised the importance of developing digital competence among students, which encompasses the ability to use digital tools efficiently, critically assess digital information, and apply digital skills in diverse academic contexts. To enhance digital competence, it is recommended to integrate digital competence assessments into curriculum design, encourage project-based learning that requires the application of digital skills, and establish peer mentoring programs for supporting the development of digital competencies. Jorge-Vázquez et al. (2021) suggested implementing a structured digital literacy curriculum embedded within the first-year experience to ensure foundational digital skills acquisition among students. They emphasised the importance of offering ongoing support and resources to facilitate continuous improvement in digital competence throughout the academic journey.

The research findings emphasise the importance of developing students' social-emotional skills and promoting clear netiquette, especially in courses where students engage in blogs, discussion forums, or other digital platforms using English as a second language. Educators should consider implementing translanguaging pedagogies (refer to Burton & Rajendram, 2019, and Hurst & Msaka, 2017 on translanguaging in online forums) to support students in navigating these environments effectively. This approach has the potential to enhance students' engagement and success in digital literacy courses and other academic programs.

5.3.2 Digital Usage

Tohara (2021) highlighted the importance of inclusive digital literacy initiatives that address diverse student needs and backgrounds. Their research advocated for culturally responsive approaches to digital education, ensuring equitable access to resources and opportunities for all students. Understanding students' digital usage patterns is crucial for optimizing educational resources and support. Educators should leverage students' digital usage habits to enhance learning experiences by providing personalized learning pathways, integrating interactive digital resources, and encouraging faculty to adopt innovative digital teaching methods aligned with students' preferences.

Furthermore, the research findings clearly demonstrate the significant role of YouTube in improving students' digital skills. It is strongly recommended to prioritise the use of Web 2.0 technologies, especially highlighting YouTube (videos embedded within the LMS) as a

valuable platform. Therefore, educators and institutions should prioritise integrating YouTube and similar Web 2.0 tools (embedded within the LMS) into educational approaches to enhance students' digital literacy and enrich their learning experiences.

5.4 Contribution of the Study

This study contributes valuable insights into the digital literacy landscape among first-year students at a University of Technology. The findings enrich our understanding of students' digital needs, competencies, and usage patterns in an academic context, informing future digital literacy initiatives and program development.

Based on the study's findings, students who actively participate in a course hosted on Blackboard are assumed to have the digital competence necessary to successfully locate, manage, integrate, evaluate, analyse, and synthesise information found online. Students have demonstrated competence with many forms of digital media, such as eBooks, online libraries, conferencing tools, and Microsoft Office.

5.5 Limitations of this Study

Despite its contributions, this study has certain limitations, including the scope of the sample size, potential biases in self-reported data, and the dynamic nature of digital technologies. Future research should address these limitations to provide a more comprehensive understanding of digital literacy in higher education. Responses to the questionnaire were based on self-evaluations. A self-assessment poll does not always accurately reflect actual performance since the participants frequently overestimate their skills and are eager to outperform their peers or impress. Future research could evaluate students' real digital literacy rather than only their perceived digital literacy, by using activities, as was done elsewhere (Chan et al., 2017).

5.6 Recommendations for Digital Literacy Training and Programme Design

The study's findings make it clear that students developed digital competence in the technical dimensions through their participation in the digital literacy course. Educators offer task design and improved scaffolding, which includes not only the technical aspects of tool usage but also broader instructional support and effective utilization of the tools in diverse online activities that promote collaboration and engagement to enhance digital literacy. Students require access to reliable infrastructure, including Internet services and appropriate devices, to promote digital literacy among first-year students. Students should be given the resources they need to participate effectively in digital literacy training and initiatives should be

undertaken to ensure the availability of these resources to first years. It is also recommended that knowledgeable and passionate information specialists should create and conduct digital literacy training. These experts can guide, advise, and effectively instruct students, ensuring that their needs in digital literacy are addressed.

All students undertaking digital literacy course must have access to materials relevant to their present level of skills to enhance their digital competence. Effective learning and skill development must be facilitated by the accessibility of appropriate materials. Students have suggested that the digital literacy programme be extended to include more about the MS Office suite, particularly MS Excel, related to non-discipline-specific subjects. These additions can be tailored to meet specific needs and enhance students' digital competence with essential digital tools.

Furthermore, to enhance digital literacy training and program design, it is recommended to collaborate with industry partners to identify essential digital skills for employability, develop interdisciplinary digital literacy courses tailored to different academic disciplines, and integrate digital badges or certifications to recognize students' achievements. Cetindamar Kozanoglu and Abedin (2021) recommended fostering partnerships with industry stakeholders to align digital literacy training with current industry demands. They emphasised the value of integrating real-world applications of digital skills into the curriculum to enhance students' employability and career readiness.

5.7 Faculty and Institutional Level

At the faculty and institutional levels, recommendations include offering professional development opportunities for faculty to enhance their digital teaching competencies, establishing institutional policies that prioritise digital literacy as a core competence for academic success and allocating resources for infrastructure upgrades and technology-enabled learning spaces to support digital initiatives. Bravo, Chalezquer and Serrano-Puche (2021) highlighted the need for collaborative initiatives involving academic departments and student support services to create a holistic approach to digital literacy education. Their research advocated for faculty development programs focusing on innovative pedagogies that leverage digital tools and resources effectively to engage and empower students.

5.8 Recommendations for Further Study

To further advance our understanding of digital literacy in higher education, future research should focus on longitudinal studies tracking students' digital competence development over

time, comparative studies across different institutions to identify best practices, and exploration of emerging technologies' impact on digital literacy requirements in academia. In addition, longitudinal studies tracking the development of digital literacy skills over time might give useful insights into the long-term impact of Web 2.0 apps on student competency.

By integrating Web 2.0 application into digital literacy training and program design, institutions can develop comprehensive strategies that address the multifaceted needs of first-year students and promote their success in navigating the digital landscape of higher education and beyond.

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Appendices

Appendix 1: Questionnaire

Section A: Biographical Information

Please place a tick (o) next to the answer that best describes you.

1. Gender:

○ Male

○ Female

○ Another gender identity

○ I prefer not to answer

2. Age:

○ <18 years

○ 19-22 years

○ 23-26

○ 27-30

○ >30

3. In which faculty are you?

○ Engineering

○ Management Science

○ Natural Science

4. What qualification are you currently registered for _____?

5. Department name: _____

6. Place of residence:

○ On campus

○ Off campus

7. Which members of your family have graduated from a university before you?

(Mark all that apply.)

○ None, I will be the first

○ Father (Stepfather)/Guardian

○ Mother (Stepmother)/Guardian

○ Brother (Stepbrother)

○ Sister (Stepsister)

○ Other

8. Who of these pay for your fees

● Father

● Mother

● Siblings

● NSFAS

● Bursary

● Other scholarship

9. Which high school did you attend?

● Public,

● Private,

● Alternative learning schools (charter schools, magnet schools, at-risk programmes),

● Home schooling

Section B: Access, use and ownership of technology

10. Which digital technologies did you use and how frequently did you use them for learning while in high school?

		Frequency of Use			
	Never	Daily	Weekly	Fortnightly	Monthly
Smart phone (e.g. iPhone, Blackberry)					
Desktop computer (e.g., PC, Mac)					
Laptop computer					
Handheld computer (e.g., Tablet, iPad,)					
Digital camera					
Video camera					
Other:					

11. For what purpose (activities) did you use the above-mentioned devices? List your activities in the blocks provided below (e.g., You use a smartphone for personal purposes such as chatting with friends).

	Purpose of Use			
	N/A	Learning	Personal	Other
Smart phone				
Desktop computer (e.g., PC, Mac)				

Laptop computer				
Handheld computer (e.g., Tablet, iPad,)				
Digital camera				
Video camera				
Other:				

12. This year, who owns the technology you most frequently use to access the Internet? (Tick all that apply)

Mark only one oval per row

	Me	University	Public library	Internet café	Cafeteria/ restaurant/ shopping mall	Family member or friend	Other	N/A
Laptop computer								
Desktop computer								
Tablet								
Ipad								
Wi-fi hotspot								

Mobile data (3G/4G)								
Other (specify):								

Section C: Digital literacy

13. This self-assessment (which covers basic computer use and file management, email, Internet, using Microsoft Word & Excel), will help you and us determine which areas you need support for. There are three options: choose the one that best describes your digital competence.

NO I have no experience of this
Somewhat I have done this occasionally but need further training
YES I am fully competent in this and can confidently apply it in the context of my courses

If your answers are mostly 'YES' or 'Somewhat', you likely have the skills to adapt to an online learning environment relatively easily. If your answers are mostly "NO", you may want to develop your digital and online skills. Please note that the learning management system site has a variety of self-training resources that you may make use of.

a) I can successfully use Blackboard tools that are required for my studies, such as:

	No	Somewhat	Yes
Navigating my course sites			
Locating information and resources			
Downloading resources and other materials			

Signing up for practicals and tutorials			
Upload assignments			
Checking assignments for plagiarism			
Accessing recorded classes			
Taking tests using the test and quizzes tool			
Where to go for help and/or help documentation			

b) I can successfully use productivity software programs, and know where to access/download Microsoft Office manuals:

	No	Somewhat	Yes
Microsoft Word			
Microsoft Excel			
Microsoft PowerPoint			
Microsoft Outlook (email purposes)			
Office 365			

c) When using information resources:

	No	Somewhat	Yes

I can distinguish the type of information to be found using search engines and that in a university library system			
I can distinguish the type of information to be found in Google or that to be in Google Scholar			
I can successfully carry out a basic search (e.g., using keyboards, phrases, etc.)			
I can distinguish between examples of digital resources having different conditions of use e.g., copyright, Creative Commons licences, etc.			

d) On the university library system, I can successfully find resources using the:

	No	Somewhat	Yes
Catalogue			
Databases			
e-Journals repository			
Digital collections			
Electronic theses and dissertation			
eBook			

e) With regards to writing and other forms of content creation:

	No	Somewhat	Yes
I can explain what is meant by plagiarism			

I use plagiarism check tool e.g., Turnitin, SafeAssign, Grammarly etc.			

f) With regards to referencing:

	No	Somewhat	Yes
I can explain the rationale for referencing			
I am able to create a reference list			
I am aware that references can be created in different styles			
I can use referencing tools e.g., Endnote, Mendeley etc.			

g) I can successfully create and share digital content with other people, in a study context. The digital content includes:

	No	Somewhat	Yes
Pictures			
Text files			
Videos			
Blog			
Websites			

h) I can use successfully use collaboration tools:

	No	Somewhat	Yes
Google drive			
Blackboard collaborate			
Personal wiki spaces			
Skype: Video chat, text chat, etc.			
Zoom: Live stream video and video chat			
WeTransfer			
Microsoft Teams			
Padlet			
FlipGrid			

i) With regard to participation in online spaces:

	No	Somewhat	Yes
I know what is meant by managing a professional online identify			
I can establish a professional learning network by connecting with experts in my field of study e.g., using Twitter, LinkedIn, Facebook, etc.			
I use social media (e.g., Facebook, Twitter, etc.) as a learning tool			

I use instant messaging (e.g., WhatsApp, Telegram, etc.) as a learning tool			

Please feel free to leave any additional comments about using digital technologies to support academic literacies in the space provided below.

Thank you for taking the time to participate. Would you be willing to give me 30-45 minutes of your time during your first semester for a focus group discussion?

Please mark only one oval.

Yes

No (If no, stop filing out this section)

Your details

Please provide your name and surname: _____

Please provide your email address: _____

Please provide your phone number (Optional): _____

Appendix 2: Focus group questions

Focus group questions

1. Could you share your school experiences, skills, practices:
    1.1. Did you have access to computer labs in high school?
    1.2. Did you make use of them? If not, why? If yes, for what did you use the computers? (e.g., typing assignments, completing projects, applying to tertiary institutions, etc.)
    1.3. What kinds of technology did your educators use in the classroom? How did these technologies help you in your learning/studies? Explain
    1.4. Did you use technology in your interaction with your educators? Explain.
    1.5. What kind of training did you receive on using your devices (Device and type of training)?
2. What skills have you acquired? How? and via which Web 2.0 tool?

2.1. Which new skills have you acquired from attending the digital literacy training? (competence)

2.2. Which Web 2.0 technology facilitated the acquisition? Please elaborate how this happened.

2.3. How has your digital literacy developed with respect to:

2.3.1. Teams, Zoom, how to use a computer, file management, BB, use of email, MS Office packages? Can you elaborate on this?

2.3.2. Critical thinking skills, Library tools and databases, searching for information (e.g., using Wikipedia, Google, Google Scholar), reducing plagiarism? Can you elaborate on this?

2.3.3. Digital communication, socialising/social skills? Can you elaborate on this?

2.3.4. Collaboration and teamwork? Can you elaborate on this?

2.4. How useful was the use of YouTube as a teaching tool for digital literacy? Rate on a scale of 1-4 (Not at all useful = 1, Not sure =2, useful =3, very useful = 4). Elaborate

2.5. How useful was the use of blogs as a teaching tool for digital literacy? Rate on a scale of 1-4 (Not at all useful = 1, Not sure =2, useful =3, very useful = 4). Elaborate

2.6. How useful was the use of discussion forums as a teaching tool for digital literacy? Rate on a scale of 1-4 (Not at all useful = 1, Not sure =2, useful =3, very useful = 4). Elaborate

2.7. Can you elaborate on how you have used any of the above for learning purposes in your courses? (usage).

2.8. Can you tell me of other instances, beyond your course, where you have used the new skills? (Possibly transformation). Please elaborate.

3. Could you tell me about your perception related to the digital literacy training you attended?

3.1. What is your experience of digital literacy training?

3.2. What was most useful about the training?

3.3. What was least/not useful about the training?

3.4. What are your perceptions about the use of YouTube for teaching digital literacy?

3.5. What are your perceptions about the use of discussion forums for teaching digital literacy?

3.6. What are your perceptions about the use of blogs for teaching digital literacy?

3.7. Did the training content meet your expectations?

3.8. Is there anything you would like further training on?

3.9. Anything else that you would like to tell me that I have not asked or suggestions (or recommendations) for the digital literacy programme?

Appendix 3: Information sheet – information about the process

Dear Student

I appreciate your willingness to participate part in my study, which aims to investigate how Web 2.0 apps could support first-year students at a South African UoT develop their digital literacy. Digital literacy are increasingly essential in higher education, especially within the current context, encompassing activities such as reading groups, collaboration, communication, information sharing, problem-solving, and constructive feedback. The shift to online learning over the past two years has highlightd the importance of digital literacy for student success in this environment.

The research will adopt a combination of a questionnaire and focus groups for data collection. In the first phase, the questionnaire will be administered during registration to understand students' digital literacy skill, both prior to university and their needs within the university context. Subsequently, students will participate in a digital literacy prpgramme, and focus groups will be conducted in the second phase. All information obtained from the focus group discussions will be treated with the utmost confidentiality. The raw data will not be accessible to Heads of Departments and course educators. Recordings will be securely stored and deleted after a year of completing the research.

You have a right to withdraw from this study at any time, and participation is completely voluntary. Additionally, you can withdraw permission for the use of data from the focus groups within two weeks after the discussion, leading to the deletion of the recording after a year of completing the research project. Questionnaires will be anonymous, and identities will be protected during focus group discussions through the use of pseudonyms. The focus groups will take not more than 45 minutes

Please be aware that:

1. By participating, you confirm that you are at least 18 old and provide permission for your answers to be used in this study and any associated publications.

2. If you need additional information about this project, feel free to ask at any stage during the research.

Your participation is highly valued, and I appreciate your involvement in advancing my understanding of digital literacy in higher education. The researcher contact details are as follow:

Name: Mandla Mhlongo

Cell no: 073 054 8275

Email: mandla.mhlongo@mut.ac.za

I thank you, in anticipation, for your time.

Appendix 4: Informed consent – participation (to be included in the questionnaire Google Form)

Dear student

You are cordially invited to take part in a research endeavour where I aim to investigate the development of your digital literacy, specifically how Web 2.0 applications utilised in the digital literacy training program could enhance the acquisition of digital literacy. Your involvement in this study holds significance as you are among the students actively using digital technologies for learning, and your insights may play a crucial role in shaping the future of the digital literacy program.

As a researcher, I kindly request your completion of a questionnaire, which is anticipated to require approximately 15 minutes of your time. Please be assured that all responses will be treated with the utmost confidentiality, and your participation is entirely voluntary. It's important to note that while efforts will be made to maintain privacy, confidentiality, and anonymity, the inherent risks associated with email or Internet usage cannot be completely eliminated.

Upon completing the questionnaire, you will have the option to provide your details if you wish to participate in a focus group discussion facilitated by the researcher. Even in this scenario, your identity will not be disclosed. I commit to treating any comments made by participants with respect and in accordance with the confidentiality agreements discussed during the session.

Participating or choosing not to participate in this research will have no impact on your association with Mangosuthu University of Technology. The insights gathered will be utilised to enhance the support provided to students in utilising technology and digital resources for online learning. Submission of the completed questionnaire will be construed as your well-informed permission/consent to participate.

If you have any queries or need clarification on anything, please contact me at 0730548275 or email mandla.mhlongo@mut.ac.za

Appendix 5: Participation in, and recording of the focus group discussions

Question	Yes	NO
I agree to take part in the focus group.		
Even though I am agreeing to participate now, I am aware that I can withdraw at any time or choose not to answer any question without facing any consequences.		
I acknowledge that I have a two-week window following the interview during which I can withdraw consent for the use of my interview data, and this data will be erased once the research is concluded.		
I have received written explanations about the study's purpose and nature, and I had the opportunity to ask questions about the study.		
I understand that the researcher will de-identify my responses, including details about my department/course, and redact any information to obscure my identity.		
I am aware that participating in this study will not offer me any direct benefits, and I understand that all information I provide will be treated confidentially.		
I agree to keep my peers' input in the focus groups confidential. I understand that in any reports on the results of this research, my identity will remain anonymous, and pseudonyms will be assigned to participants and any potential identifiers to maintain anonymity.		
I comprehend that excerpt from my interview might be used in a dissertation, conference presentation, or published papers, among other things.		
If I disclose that I or someone else is at risk, I understand that the researcher will consult with me first, but reporting may be necessary with or without my approval.		
I understand that signed consent forms and original audio recordings of my interview, including any identifiable information recorded, will be deleted a year after the completion of the research.		
Under freedom of information legislation, I am entitled to access the information I provided at any time while it is in storage, as specified above.		
I am free to contact any of the individuals involved in the research for further clarification and information.		

I have given my informed consent to being audio-taped during the focus group discussion, provided that the confidentiality of my contribution is maintained.		
I agree to take part in the focus group.		
Even though I am agreeing to participate now, I am aware that I can withdraw at any time or choose not to answer any question without facing any consequences.		
I acknowledge that I have a two-week window following the interview during which I can withdraw consent for the use of my interview data, and this data will be erased once the research is concluded.		

Researcher signature: ….....

Participant signature: ….....

Appendix 6: Digital literacy programme design

By adopting this approach, the current study will be more able to achieve its objectives.

Table 1: Competences to be covered in the digital literacy course

Topics	Digital literacy dimension	Tools used	Module
Teams, Zoom, basic skills on how to use a computer, file management, and intro. to BB, email, Ms. Office packages	Technical	YouTube	
Critical thinking skills, Library tools, and databases, searching for information, reducing plagiarism	Technical and Cognitive	Blog and discussion forums	
Digital communication, socialising/social skills	Social-Emotional	MS Office suite (Emails and Teams)	
Collaboration and teamwork	Technical-Cognitive	Teams	

The Digital Literacy course designed for the development of student digital literacy

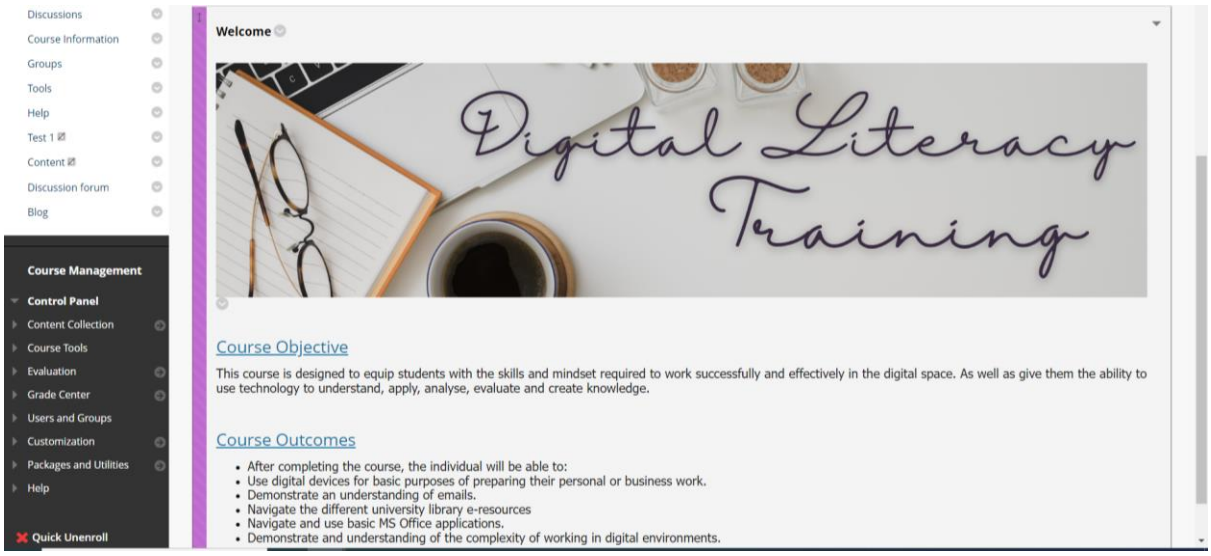
The digital literacy course was designed using Diana Laurillard's Conversational Framework and implemented on Blackboard LMS because of its availability among university students and its easy accessibility. By using Diana Laurillard's Conversational Framework, the Digital Literacy Course with Blackboard LMS Integration aimed to facilitate the acquisition of basic digital literacy among first time entering students (Laurillard, 1993 & 2002). Engaging and collaborative learning was made possible in the course by using the various interactive tools offered by the Blackboard LMS, such as blogs, discussion forums, and embedded versions of YouTube. Students enhanced their digital literacy and were adept at navigating the digital environment as a direct result of the significant approach that was used in their course of study. The course overview is provided in Appendix A, and it covers a wide range of topics, including digital literacy, digital tools, online communication, information literacy, digital content creation, and more. This holistic approach guaranteed that students, both inside and

outside of the classroom, effectively gained the critical digital literacy important for succeeding in today's digital age. These skills are essential for students to acquire in order to be successful in today's digital world.

Course Outline:

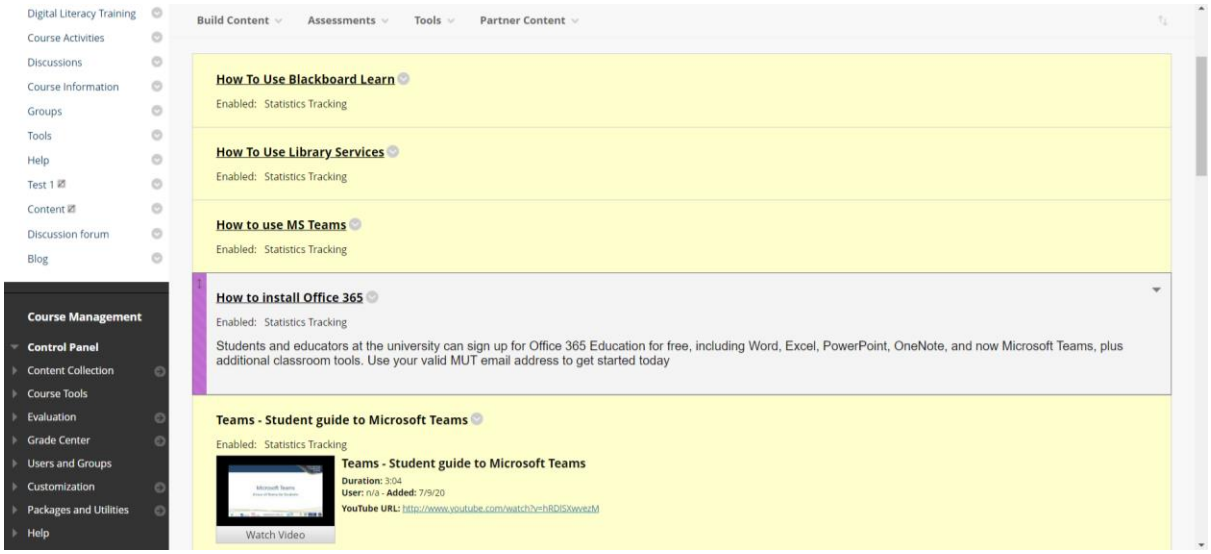
Module 1: Introduction to Digital Literacy

- Participants understood the significance of digital literacy in the modern world.
- Different dimensions of digital literacy and their relevance in various contexts were explored.



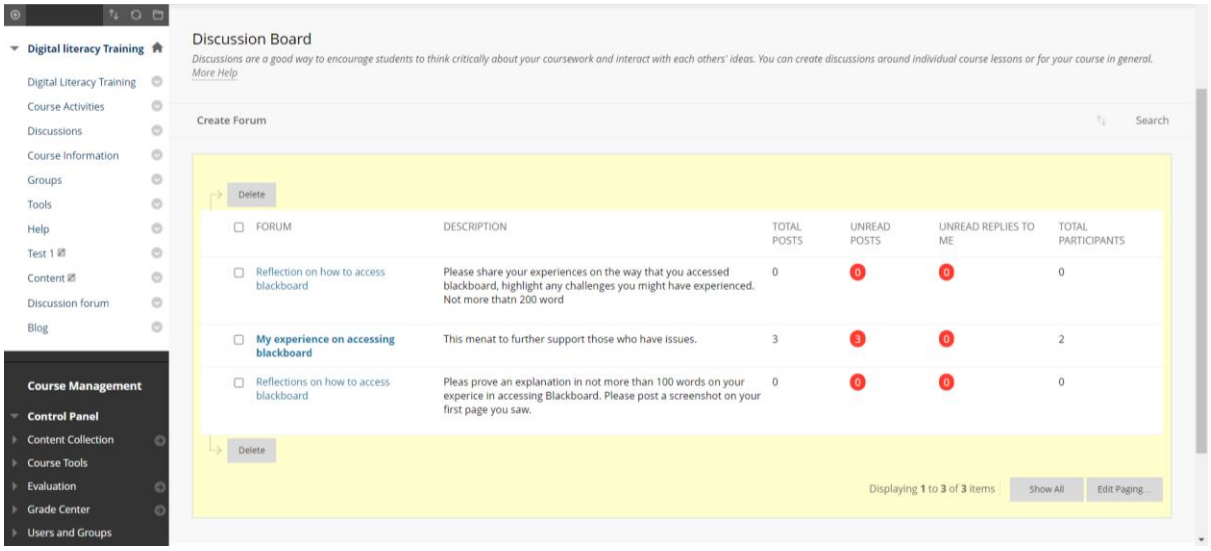
Module 2: Digital Tools and Technologies

- Participants familiarised themselves with essential digital tools and technologies, including Blackboard LMS, Microsoft Word, Microsoft Excel, Microsoft PowerPoint, and other relevant applications.
- Step-by-step guidance was provided on using these tools effectively.



Module 3: Online Communication and Collaboration

- Participants developed effective online communication skills through Blackboard's messaging and discussion board features.
- Collaborative learning was promoted through group projects and activities facilitated by the discussion forums.



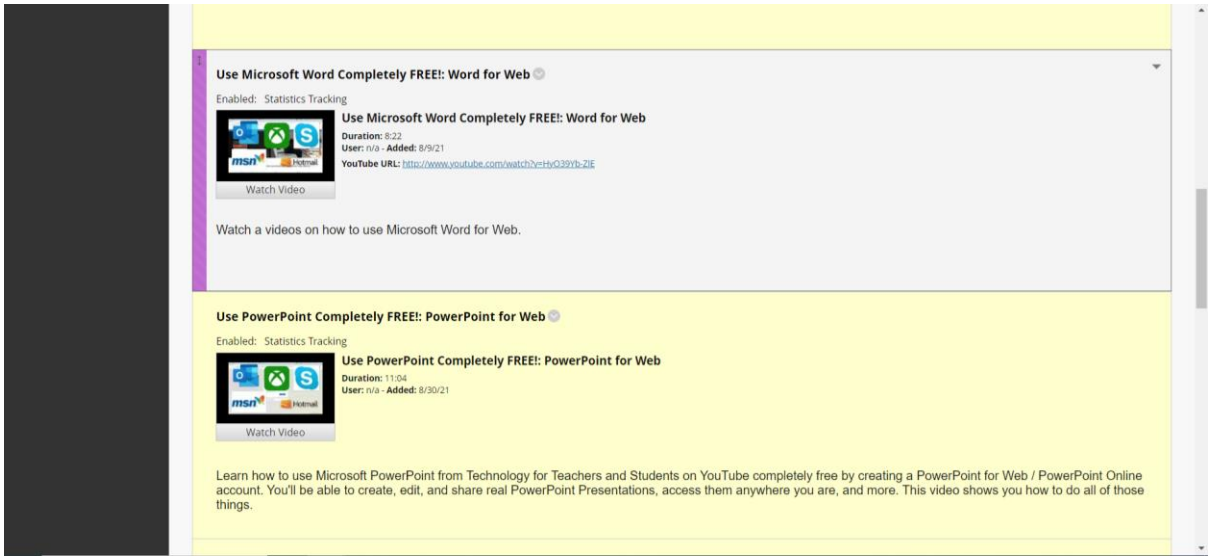
Module 4: Information Literacy and Digital Research

- Participants were introduced to information literacy principles for evaluating and critically analysing online sources.
- Blackboard's library integration and search tools were utilised for digital research exercises.

Link for the video: https://mutelearn.mut.ac.za/courses/1/Train0604/content/_46852_1/index.html#/slide/FpnF2kDtM

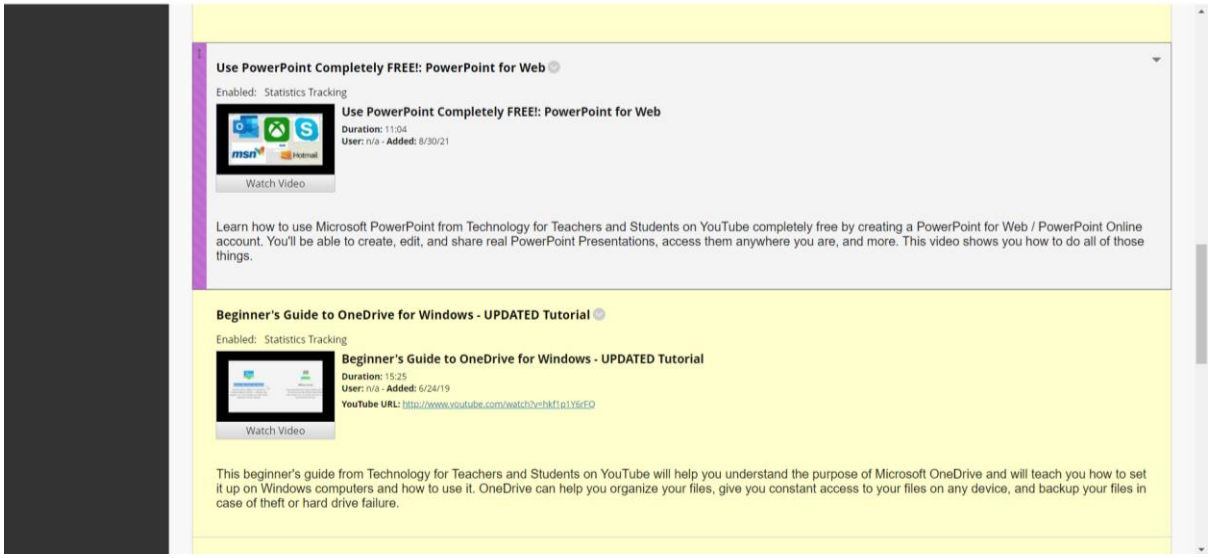
Module 5: Digital Content Creation and Sharing

- Students were encouraged to create and share digital content using Blackboard's content creation features.
- Ethical considerations and best practices for digital content creation and sharing were explored.



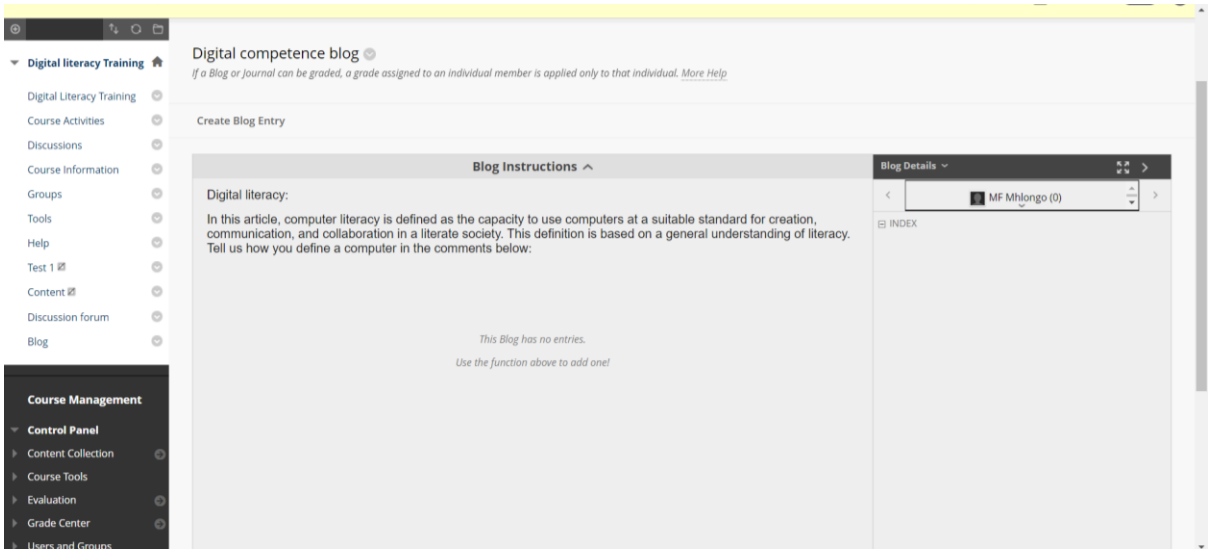
Module 6: YouTube Integration for Video Learning

- YouTube videos were integrated into the course content to enhance engagement and provide visual learning opportunities.
- Discussions and reflections on the video content were facilitated through Blackboard's discussion forums.



Module 7: Reflective Blogging

- Reflective practice was promoted through individual or group blogging activities on Blackboard.
- Students were encouraged to share their experiences, insights, and challenges related to digital literacy development.



Module 8: Digital Safety and Responsible Online Behaviour

- Awareness about online safety, privacy, and security measures was raised.
- Discussions and activities on responsible digital citizenship were facilitated within the Blackboard discussion forums.

Module 9: Critical Thinking and Problem-Solving in the Digital Age

- Critical thinking skills were developed to evaluate digital content and solve digital-related challenges.
- Problem-solving activities were engaged using Blackboard's interactive tools and resources.

Module 10: Continued Learning and Professional Development

- Resources and strategies for ongoing digital literacy development beyond the course were provided.
- Students were encouraged to explore additional online courses, webinars, and resources for further skill enhancement.

The Digital Literacy Course with Blackboard LMS Integration offered a comprehensive learning experience that combined the benefits of Diana Laurillard's Conversational Framework with the advanced features of Blackboard LMS, with the focus of developing students' digital literacy (Laurillard, 1993 & 2002). Within this programme, an innovative learning environment was created, enabling students not only to acquire theoretical knowledge but also to apply it in practical ways. The use of YouTube as a learning tool participating in interactive and thought-provoking blog discussions, and active participation in dynamic discussion forums were important elements.

The intention behind this integration was to develop students' digital literacy, allowing them to acquire effective digital literacy. These included the skills to navigate the intricate digital environment effectively and skilfully, all within the specific context of their academic studies. Lastly, the digital literacy programme, which is perfectly developed on Blackboard LMS, aimed to equip students with the competences important to succeed in a world that is becoming increasingly digital. The focus was to develop these skills, the researcher aiming not only to prepare students for success in their academic studies but also equip students as skillful navigators of the ever-changing digital environment, positioning them for success not only in their educational studies but also in the wider contexts of their lives.

Appendix 7: Usage of technology by students during high school years and the frequency of its use

	Never	Daily	Weekly	Fortnightly	Monthly
Smart phone (e.g. iPhone, Blackberry)	28	204	23	3	17
Desktop computer (e.g., PC, Mac)	170	17	49	12	27
Laptop computer	161	44	30	14	26
Handheld computer (e.g., Tablet, iPad,)	212	36	15	2	10
Game console	212	13	15	9	29
Digital camera	200	21	22	18	14
Video camera	194	25	32	9	15
Other:	198	32	14	10	21

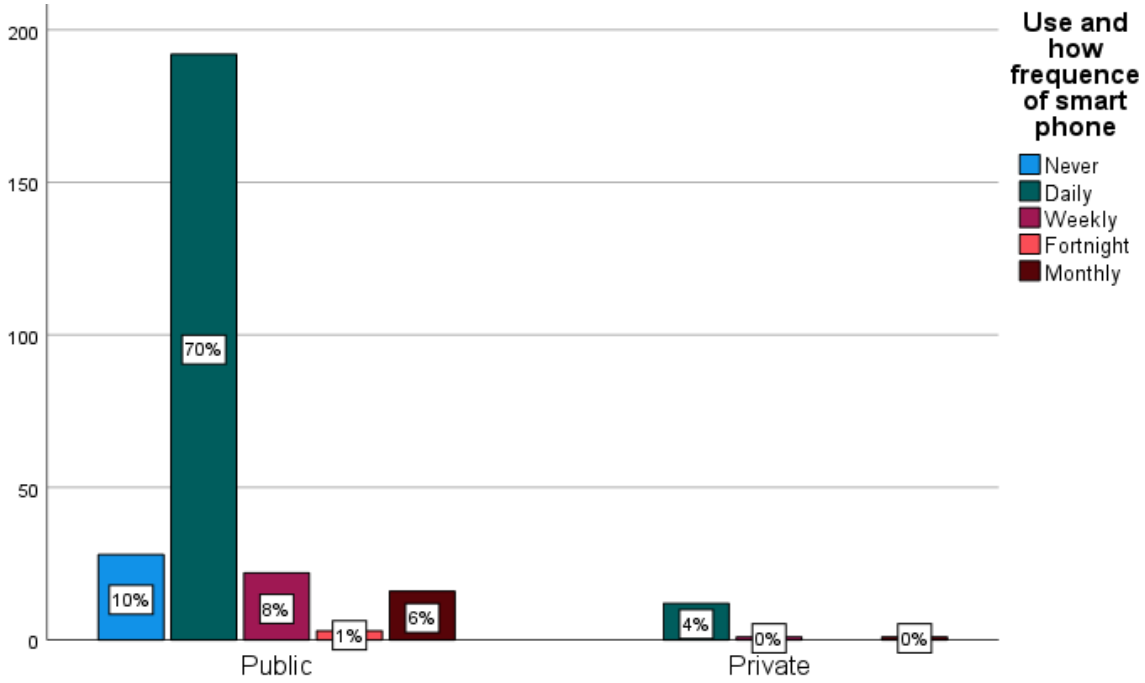
Appendix 8: Access to digital devices for students residing off campus when they are not on campus

	Me	University	Public library	Internet café	Cafeteria/ restaurant/ shopping mall	Family member	Other	N/A
Laptop computer	46	50	10	11	2	35	0	16
Desktop computer	9	114	7	12	0	11	0	17
Tablet	31	17	7	7	2	57	2	47
iPad	18	15	10	13	2	58	1	53
Wi-fi hotspot	17	132	5	2		6	2	6
Mobile data (3G/4G)	71	91	1	1	1	3	0	2
Other (specify):	70	24	3	5	3	19	2	44

Appendix 9: Students use of university library system

	No	Somewhat	Yes
Catalogue	133	71	71
Databases	131	71	73
e-Journals repository	187	51	37
Digital collections	159	66	50
Electronic theses and dissertation	174	57	44
eBook	138	58	79

Appendix 10: High school use and how frequency of smartphone



Appendix 11: Digital devices used in high school

	Frequency of Use				
	Never	**Daily**	**Weekly**	**Fortnightly**	**Monthly**
Smartphone (iPhone, Blackberry)	28	209	24	3	18
Desktop computer (e.g., PC, Mac)	172	19	50	13	28
Laptop computer	164	45	30	15	28
Handheld computer (e.g., Tablet, iPad)	218	36	15	2	11
Games console (e.g., Xbox, PlayStation, Nintendo)	217	13	16	10	26
Digital camera	204	22	22	20	14
Video camera	196	26	33	11	16
Other:	202	34	15	10	21

Appendix 12: MUT Ethical Clearance

MUT
MANGOSUTHU
UNIVERSITY OF TECHNOLOGY

Research Directorate

UMLAZI KWAZULU-NATAL
PO Box 12363 Jacobs 4026 Durban
Tel: 031 907 7450

21 April 2022

REF: RD1/13/2022

Mr Mandlenkosi Mhlongo
Mangosuthu University of Technology

Dear Mr Mhlongo

PROTOCOL: 'The role of WEB 2.0 applications in the acquisition of digital literacies by first-year students at a South African University of Tehnology.'

The MUT Research Ethics Committee considered your application at their meeting held on 01 April 2022. It is my pleasure to inform you that permission to conduct the research project above was granted.

The approval is valid for two years from 01 April 2022. Any changes to the project must immediately be brought to the attention of the MUT Research Ethics Committee.

Your acceptance of this approval denotes your compliance with South African National Research Ethics guidelines (2004) and the MUT Research Ethics Policy, Procedures and Guidelines

Good luck with your research.

Yours sincerely,

Dr A Mienie
Director: Research

Appendix 13: UCT Ethical Clearance

SCHOOL OF EDUCATION

Dr Carolyn McKinney
Associate Professor

University of Cape Town, Private Bag X3, Rondebosch, 7701
Physical address: Neville Alexander Building, 6 Lover's Walk, Lower Campus
Tel: +27 (0) 21 650 2757 / 2772 Fax: +27 (0) 21 650 3489
E-mail: carolyn.mckinney@uct.ac.za http://www.education.uct.ac.za/edu/staff/academic/cmckinney

EDNREC20220802

4 August 2022

Mandlenkosi Franscis Mhlongo

M.Ed

Dear Mr Mhlongo

Re: Ethical Clearance for Research Project

I am pleased to inform you that ethical clearance has been granted by the School of Education Research Ethics Committee of the Faculty of Humanities for your research project entitled: EXPLORING THE ROLE OF WEB 2.0 APPLICATIONS IN THE ACQUISITION OF DIGITAL LITERACY SKILLS BY FIRST-YEAR STUDENTS AT A SOUTH AFRICAN UNIVERSITY OF TECHNOLOGY. This approval is valid for 1 year ending on 31 August 2023.

I wish you all the best with your study.

Yours sincerely,

Associate Professor Carolyn McKinney
Chair - School of Education Research Ethics Committee

Appendix 14: Editor's letter

Nikki Watkins
Editing/proofreading services
Cell: 072 060 2354 E-mail: nikki.watkins.pe@gmail.com

23 November 2023

To whom it may concern

This letter confirms that I have language edited and proofread the master's thesis

EXPLORING THE ROLE OF WEB 2.0 APPLICATIONS IN THE ACQUISITION OF DIGITAL LITERACY SKILLS BY FIRST-YEAR STUDENTS AT A SOUTH AFRICAN UNIVERSITY OF TECHNOLOGY

By

MANDLENKOSI FRANSCIS MHLONGO

UK Centre of Excellence Editing and Proofreading Diploma
SA Writers College Certificate of Copy-Editing and Proofreading

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