School of Education

The preparedness of New Zealand secondary school students for first year undergraduate studies in a digital learning environment

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Declaration

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no materials which has been accepted for the award of any other degree or diploma in any university.

Human Ethics The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262) Approval Number # HRE2016-0283.

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Ehara taku toa i te toa takitahi, engari kē he toa takitini

Abstract

New and emerging digital technology continues to shape the education environment at all levels and the education sector needs to ensure that the current learning environments are preparing students for a digitally enabled society. Students, across the education sector, are deeply immersed in the digital environment, but this high level of digital exposure does not necessarily mean they possess the digital skills, knowledge, confidence and strategies needed to be successful digital learners. Today's secondary school students need to be both prepared and confident as they progress into the undergraduate digital learning environment. Educators and education decision makers play a crucial role in supporting students to make the transition from consuming digital technology to using technology for the purpose of learning.

This research aims to examine the perceived level of preparedness and confidence of students in their final year of secondary school for the digital learning expectations of the Aotearoa New Zealand (NZ) tertiary sector. The study focus is the dimensions of the student digital learning experience that includes using digital technology for the purpose of learning, student digital literacy levels and digital access. This access includes the education provider who has well-developed digital infrastructure and provides students with digital learning opportunities. The study employs a qualitative approach and uses theoretical sampling to explore the experiences of Year 13 secondary school biology students (N=92), first year undergraduate students enrolled in health science disciplines (N=88) and health science undergraduate lecturers who taught first year undergraduate students (N=7). In a NZ context, Year 13 biology is a prevalent science subject pre-requisite for entry to the undergraduate programmes in NZ. The participants in this study were accessed from secondary schools and tertiary providers from within a geographically convenient region in NZ. They consisted of two regional secondary schools who offered, and had students enrolled in, a NCEA Level 3 biology course, and three regional tertiary providers, who offered undergraduate programmes in the health science discipline where NCEA Level 3 biology was either a pre-requisite or strongly recommended as an entry criteria. These cohorts shared their knowledge, understanding and awareness of their experiences of preparedness for first year undergraduate studies in the digital learning environment in NZ.

This research determined that there were a number of factors, including educator preparedness, digital access and student preparation, that impact on student preparedness for tertiary study in NZ. While there is evidence of a disconnect between student and undergraduate lecturer perceptions of student preparedness, the research identified both secondary and undergraduate students need greater support from both educators and education providers to improve their preparedness for the undergraduate digital learning environment. The new knowledge gained from this study will contribute to a better understanding in the secondary and tertiary sectors by providing them with insight into how students view their preparation for the undergraduate digital learning environment.

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Glossary

20th century educators: educators who have to acclimatize to the digitally focused education environment (Adams & Pente, 2011).

21st century students: students whose experiences have been shaped by an environment that is both electronic and digital (Palfrey & Gasser, 2013).

New Zealand Curriculum achievement standards (AS): New Zealand Curriculum based assessments that are designed to measure the student's level of knowledge against registered criteria (New Zealand Qualifications Authority|Mana Tohu Mātauranga o Aotearoa (NZQA), n.d.-b)

Bring your own device (BYOD): BYOD is a scheme in New Zealand Schools to increase digital technology availability for student use at school and the devices are the property of the student (Ministry of Education|Te Tāhuhu o te Mātauranga (MoE), 2015a).

Digital capability: a term used describe the skills, knowledge and understanding needed to enable people to be able to thrive in a digitally focused society (University of Derby, 2021)

Digital citizenship: includes the values and key competencies of the New Zealand Curriculum (Te Kete Ipurangi, n.d.-a) and is the outcome of achieving digital fluency (Netsafe, 2015a).

Digital competence: encompasses the effective use of digital technologies underpinned by an understanding of the implications and effects of digital technologies on the socio-cultural landscape (Falloon, 2020).

Digital confidence: is the self-assurance of both students and educators to be able to engage with digital technologies for the specific purpose of teaching and learning (Passey et al., 2018).

Digitally connected: having access to digital devices, network infrastructure and software applications that enables individuals to exercise their digital autonomy (Cohen et al., 2018)**.**

Digital difference: captures the multifaceted nature of the digital divide and includes school and home access; school use and generation birth cohort (Warschauer, 2007).

Digital fluency: a proposed set of competencies that enables the participation in a digital society and has three elements: digital literacy, knowledge of the digital environment and attitude and values online (Netsafe, 2015a).

Digital learning: is an umbrella term that encompasses the sub-sets of e-learning and online learning.

Digital learning environment (DLE): an environment where "digital technology has become a component of … teaching and learning practice" (Brown et al., 2015, p. 3).

Digital literacy: a fundamental aspect of digital citizenship and includes the skills, knowledge and strategies (Netsafe, 2015a) to be "discerning and critical; able to locate, understand, organises, evaluate and adapt digital contents" (Te Kete Ipurangi, n.d., para. 2).

Digital technology: the technology infrastructure, including hardware and software (Twining et al., 2015).

Digital tools: a term used by New Zealand teachers and principals to describe the information and communication technology that is utilised by teachers to facilitate of digital learning (Bolstad, 2017).

Educator: secondary school teachers and undergraduate lecturers who facilitate the student learning experience.

E-Learning: describes learning that facilitated by digital technology (Wheeler, 2012). Parkes et al. (2013) defines e-learning as learning mediated by a learning management system (LMS).

Internet age: the era of digital connectedness that "includes use of computers and other devices that are connected through local networks or the Internet" (Howard & Mozejko, 2015, p. 5).

Kete: a knowledge basket.

Learner agency: a term used in Aotearoa New Zealand to explain how students have the ability to act and make choices concerning their learning and the education contexts meets the needs and interests of the student when in a student-centred environment (MoE, 2014a).

Learning management system (LMS): an interactive digital learning environment used by educators to facilitate learning using digital technology (Ifenthaler, 2012).

National Certificate of Educational Achievement (NCEA): Aotearoa New Zealand's main qualification for secondary school students. It provides the academic entry criteria for universities and polytechnics for New Zealand school leavers (NZQA, n.d.-a).

Online learning: a term used by the New Zealand Tertiary Education Commission|Te Amorangi Mātauranga Matua (TEC) tertiary sector to describe digital teaching and learning experience (TEC, 2020).

Preparedness: refers to students possessing a high level of confidence to be able self-regulate their learning experiences to participate in the digital learning environment (Kizilcec et al., 2017). It incorporates the knowledge, skills and attitudes students require as digital learners (Parkes et al., 2015).

Pre-university: refers to study that is "designed to enable students to gain the necessary background knowledge and skills … to undertake tertiary study" (Victoria University of Wellington, n.d., para. 8).

Readiness: the traits and characteristics students need to have to be online learners (Parkes et al., 2015).

School Decile: a New Zealand term that describes the socio-economic status of a school's student community (N4L, 2019).

Self-regulation: considers students' ability to self-manage and successfully navigate their learning experiences (Zumbrunn et al., 2011).

Skills and strategies: a term that is included as a core aspect of the Netsafe Digital Citizenship Model which describes what students need “to access technology to communicate, connect, collaborate and create” (Netsafe, 2018, p. 4).

State school: public schools that are funded by the NZ government and provide free education for domestic students.

Teacher: Year 13 biology teacher employed in an Aotearoa New Zealand secondary school.

Tertiary: a term used in Aotearoa New Zealand to describe “any form of learning that happens after completing secondary school” (NZQA, n.d., para.1). This learning may occur in a tertiary education organisation or workplace.

Transition: a term that describes the progression of secondary school students into undergraduate study, where students leave secondary school and enter undergraduate studies (Gueudet & Thomas, 2020).

Undergraduate lecturer: undergraduate degree level educator employed in an Aotearoa New Zealand Institute of Technology and Polytechnic or a New Zealand University, who in this study teaches first year undergraduate students enrolled in health science disciplines.

Undergraduate student: student who is enrolled in an undergraduate health science degree in an Aotearoa New Zealand Institute of Technology and Polytechnic or New Zealand University.

University Entrance: is the minimum entry requirement for school leavers to be eligible for admission into undergraduate study in Aotearoa New Zealand (NZQA, n.d.)

Year 13: The final year of secondary schooling in Aotearoa New Zealand

List of Abbreviations

AFG: Asynchronous focus group

AS: New Zealand Curriculum achievement standards

BYOD: Bring your own device

DLE: Digital learning environment

Edtech: Education technology

ICT: Information and Communication Technologies

MoE: Aotearoa New Zealand Ministry of Education|Te Tāhuhu o te Mātauranga

L3: Level 3

LMS: Learning management system

NCEA: National Certificate of Education Achievement

NZ: Aotearoa New Zealand

NZ Curriculum: New Zealand Curriculum document

NZ Government: New Zealand Government|Te Kāwanatanga o Aotearoa

NZQA: New Zealand Qualifications Authority| Mana Tohu Mātauranga o Aotearoa

OLR: Online learning resource

PG: Postgraduate

ResearchNZ: Research New Zealand

TEC: Tertiary Education Commission|Te Amorangi Mātauranga Matua

UG: Undergraduate

UGL: Undergraduate lecturer

UGS: Undergraduate student

Yr13: Year 13

Yr13S: Year 13 student

Chapter 1 Introduction

The education sector is constantly evolving to incorporate emerging technologies to support the student learning experience. This evolution has included the introduction of digital learning environments (DLE) across what Howard and Mozejko (2015) described as “the three ‘ages’ of technology integration: pre-digital, personal computer and the internet” (p.157). The internet age focuses on the digital connectedness of devices and this connectedness influences the manner in which information is accessed. This has led to a pedagogical shift in education and there has been high growth in, and adoption of, digitally focused education internationally (Li & Lalani, 2020).

The recognition of the digital transformation led to the publication of Paul Glister’s seminal work in 1997 titled *Digital Literacy*. Glister described digital literacy from the perspective of cognitive skills and competencies that needed to be developed to enable the active engagement with digital technology. He viewed digital literacy as “the logical expansion of literacy itself” (p .230). Since this time definitions of digital literacy and related digitally focused concepts, including digital citizenship, digital ability, digital fluency, and so forth, have continued to evolve (Rennie & Smyth, 2020). To provide clarity, these concepts and terms will be further elaborated upon in Section 1.2.1.

Digitally focused concepts are continuously evolving and the education sector is constantly adapting to ensure education is future-focused. Students need to have the digital skills, knowledge and strategies to confidently participate in the DLE and be prepared for the 21st century. However, concerns have been voiced by educators across the education sector regarding the digital literacy abilities of today’s students (Tang & Chaw, 2016). For example, students with limited digital abilities are deemed to be not fully prepared for the digital environment (Hong & Gardner, 2018). It was suggested that students need to be provided with the opportunity to engage with digital technology to develop their digital abilities for the specific purpose of learning (Tang & Chaw, 2016), and that the tertiary sector needs to develop a better understanding of students' digital abilities and how these impact on their level of confidence and preparedness for DLEs. Furthermore, students' participation, confidence, skills, knowledge and preparedness can be impacted by digital difference, where students' school and home access, school use and generational birth cohort affects their ability to successfully participate in the DLE (Warschauer, 2007). The generational birth cohort affects the point of intersection between 21st century students and 20th century educators. Educators who have been described by Adams and Pente (2011) as needing to acclimatize to the digitally focused education environment. Rossi (2015) suggests that for students to be confident and able to participate in the DLE their educators need to also be prepared for the DLE. Educators need to possess the necessary skills, knowledge and confidence to be able to participate in the DLE and effectively prepare students for the digital requirements of a 21st century knowledge-based society.

In Aotearoa New Zealand (NZ) the successful integration of technology into the learning environment is recognised by NZ educators and education decision makers as a priority (Bolstad, 2017). For example, in 2014, at the commencement of this study, it was a priority of the NZ Government|Te Kāwanatanga o Aotearoa (The NZ Government) for "young New Zealanders … to be equipped with the values, knowledge and skills to be successful in the 21st Century" (Ministry of Education|Te Tāhuhu o te Mātauranga (MoE), 2014b, p. 4). At this time, there were concerns with regard to the digital abilities of young New Zealanders as they progressed from their final year of secondary school to first year undergraduate (UG) study (Emerson et al., 2014; Woulfe, 2014). In 2017, the priority further evolved and the NZ Government became committed to an NZ education system that develops students with the digital literacy and digital fluency abilities needed to be successful in today's digitally orientated environment (MoE, 2017a). In 2017, the Netsafe's Digital Citizenship Model (Netsafe, 2015a) was adopted by the MoE to set out the values and competencies the NZ Government has determined for NZ students in the 21st century (Te Kete Ipurangi, n.d.-a).

At present there is paucity of research that examines these issues from a NZ perspective, in relation to the preparation of NZ secondary students for the UG DLE, specifically in health science disciplines. The aim of this thesis is to address this research gap by examining the perceptions of Year 13 (Yr13) biology students, first year UG students, and UG lecturers regarding the preparedness of Yr13 biology students for the NZ UG DLE in the health science disciplines. It is anticipated that this study will contribute to better understanding to support a smoother progression for secondary students into the digital learning expectations in tertiary level study, in order to meet the NZ Government's expectations (MoE, 2014b).

The following sections present the rationale of the study (Section 1.1) and introduce the reader to the context of this research study, Aotearoa New Zealand. The digitally focused concepts and terminology used in this study are then discussed in Section 1.2. The research question, aims and sub-questions are introduced in Section 1.3. The significance of the study is discussed in Section 1.4 and the chapter concludes with the organisation of the thesis in Section 1.5.

1.1. Rationale of the study

Each year, approximately 60,000 NZ secondary school students progress to their post school pathways which include further education, workplace training or employment (Education Counts, 2020). In 2019, 59.7% of school leavers (36,582 students) were enrolled in the tertiary education sector, and 31.9% of these students enrolled in a UG qualification (Education Counts, 2020). The majority of UG students today are digitally connected, having access to digital devices, network infrastructure and software applications that enables individuals to exercise their digital autonomy (Cohen et al., 2018). They arrive at class with their preferred digital device, smartphones, laptops and tablets, expecting all resources to be available to them via a DLE (Flanigan & Titsworth, 2020). However, there is a high degree of risk as they progress from their final year of secondary school to first year UG study. Bowles et al. (2014) and Sotardi and Friesen (2017) identified that first year UG students feel they are unprepared to study at university level. In their study on the transition experience of NZ first year UG students, Sotardi and Friesen (2017) propose this feeling of unpreparedness was experienced by 60% of the study participants. A degree of this unpreparedness has been attributed to student expectations of how learning will occur, including self-regulated learning requirements. There are assumptions made about UG students' digital skills, knowledge and strategies, and their preferred learning styles when they progress from secondary school to tertiary education by academic staff (Judd, 2018).

The NZ education system comprises of three levels, Level 1 is early childhood, Level 2 includes both primary and secondary school and Level 3, is the tertiary education sector. The system is designed for each level to provide the foundational knowledge that students require to successfully progress to the next level (MoE, 2019) . Figure 1.1 provides an overview of the NZ education system.

Figure 1.1.

Aotearoa New Zealand Education System Structure

Level 1	Level 2	Level 3
Early childhood education (Year 0)	Secondary Education (Years 9-13) Primary Education (Years 1-8)	Tertiary Education

Note. Adapted from https://www.education.govt.nz/our-work/our-role-and-our-people/education-in-nz/ Copyright (2019) by MoE.

There has been criticism from NZ tertiary institutions that secondary school students are not prepared for an effective progression from Level 2 to Level 3 of the NZ education system (Cowlishaw, 2018; Education Central|Pokapū Mātauranga, 2019b; New Zealand Council for Educational Research|Rangahau Mātauranga o Aotearoa, 2018; Woulfe, 2013). The reason for this criticism is due to UG lecturers expecting that students are prepared for UG study, and have the content knowledge and discipline skills required on arrival (Emerson et al., 2015b). In recent years, this criticism has been expanded to included digital abilities. Burton et al. (2015) refers to this as the rhetoric of higher education.

During 2019, 59.7% of NZ school leavers progressed into tertiary education (Education Counts, 2020). While there is diversity in the individual contexts that NZ secondary school students are progressing into, the development of digital capability is critical to ensure students' progress is both effective and successful (Broadband Commission for Sustainable Development, 2017). It is therefore necessary that all secondary school students develop their digital abilities, including the skills, knowledge and strategies that are required to be able to fully participate in a digitally focused tertiary education system. These digital abilities include, and are not limited to, students being able to be "discerning and critical; able to locate, understand, organise, evaluate and adapt digital contents" (Te Kete Ipurangi, n.d., para. 2). While the level of digital abilities required is dependent on the specific entry requirements of UG programmes, this study is focused on the core digital abilities that students need to develop.

Emerson et al. (2014) acknowledge that NZ secondary school teachers have "little understanding of the digital nature of tertiary study [and the] independent learning demands" (p. 103). This level of understanding is complicated by the view of NZ UG lecturers that the National Certificate in Education (NCEA), the main national qualification for secondary school students in NZ, should be ensuring students are adequately prepared for tertiary level studies (Tapaleao, 2014; Woulfe, 2013). However, this preparation is not solely for the tertiary education sector (MoE, 2007) . Furthermore, industry has also identified concerns with the level of digital preparedness of secondary school leavers for the workplace (Dudman, 2017; "Passport to employment starts," 2016; The New Zealand Productivity Commission, 2020). When considering this feedback from key stakeholders, a conclusion can be drawn that the secondary school sector is not consistently providing the students with the expected level of digital preparedness required to enable them to effectively progress into their post school pathway.

Teaching and learning practices both globally and within the NZ education systems have seen a transformation (New Zealand Council for Educational Research|Rangahau Mātauranga o Aotearoa, 2012). The secondary school teaching and learning environment is changing from a teacher-centric model to the student being positioned at the centre of their learning experience (Baeten et al., 2016). Delivery has changed from a *talk and chalk* mode of delivery to the continuum of digital delivery, where most students have a digital device to facilitate their learning experience. Today's students are being shaped by an environment that has been described by Palfrey and Gasser (2013) as both electronic and digital. The presence of digital devices in the classroom is common-place today and , generally, students are confident using digital technology (Porat et al., 2018). As a result, UG lecturers today are erroneously expecting students will be prepared for the digital learning expectations of UG study (Parkes et al., 2015).

A search of the literature suggested that while students today are immersed in a digital culture there are concerns regarding their digital skills, knowledge and strategies and ability to utilise digital technologies for learning purposes (Parkes et al., 2015). An experience that is consistent across the NZ education sector (Woulfe, 2013). The literature indicates the developing of digital abilities is recognised as an essential requirement of today's education system (The New Zealand Productivity Commission, 2020; Valek & Sladek, 2012). Digital literacy, a component of digital fluency, is crucial for the development of the level of confidence and preparedness needed for successful educational outcomes (Karpati, 2011).

Preparedness has been defined by Conley (2008) as the students' ability to "succeed – without remediation – in a credit bearing postsecondary institution" (p. 21). Parkes et al. (2015) proposes preparedness incorporates the digital learning context and is regarded as the behaviours that students need to be able to demonstrate to be digital learners, while e-learning is learning that occurs through participation in a learning management system (LMS). Preparedness in the scope of this study thus refers to students having a high level of confidence, are able to self-regulate their learning experiences while participating in the DLE (Kizilcec et al., 2017).

Finally, to prepare students for the digital expectations of UG study, UG lecturers must also demonstrate a level of preparedness to teach in the DLE (Al Khateeb, 2017;

Greener & Wakefield, 2015). By studying preparedness from the perspective of Yr13 biology students, UG students and UG lecturers in health science disciplines, understanding of the needs of students who are progressing from secondary school to first year UG studies may be improved.

1.2 Study Scope and Definitions

The NZ Government is focused on future-proofing the NZ education system so it is able to adapt as new digital technology emerges. The NZ Government's vision is for NZ to be a world leader in digital education The priority is to move the education system to a digitally orientated environment to ensure all students have the opportunity to develop their digital competencies through the implementation of a National Curriculum with improved visibility and integration of digital technologies (Kaye, 2017). In 2017 this priority was focused on all students enrolled in Years 1-10 of Level 2 of the NZ education system undertaking digital technology focused learning to develop their digital knowledge and skills. To achieve this the NZ Government recognised students needed to have access to digital learning opportunities across all learning areas of the New Zealand Curriculum (NZ Curriculum) and improved collaboration between the secondary and tertiary education sectors. Improved intersectorial collaboration produces an education system that delivers "better, more relevant pathways for learners transitioning out of school into tertiary education" (MoE, 2016, p.10).

The synergies between the secondary schools and post school pathway stakeholders do not always fully align, and there are areas where the evidence clearly indicates an effective progression of secondary school students into UG study has not been achieved. To address this lack of coherence from a tertiary education perspective, and to ensure this study adds value to the current discourse, the key concepts adopted throughout the discussion in this document are consistent with the NZ Curriculum and the Netsafe Digital Citizenship Model (Netsafe, 2015a).

1.2.1 Conceptual clarity

Aspects of the digitalisation in education are widely discussed in the literature. However, global digitalisation is continually evolving, and as a result of this process many of the terms associated with digitally focused learning that were adopted at the inception of this research have evolved and nuances have changed (Mason & Pillay, 2017). Moreover, many of these terms are often used interchangeably today. To provide the reader with clarity of the scope and context of this research, this section provides definitions of the key concepts that have contributed to the framing of the research question, research aims and sub-questions. Specific concepts discussed are: Bring your own device (1.2.1.1), digital competence (1.2.1.2), digital confidence (1.2.1.3), digital learning (1.2.1.4), digital technology (1.2.1.5), preparedness (1.2.1.6) and self-regulation (1.2.1.7).

1.2.1.1 Bring your own device

Aotearoa New Zealand primary and secondary schools are adopting "Bring Your Own Device" (BYOD) schemes to increase the access of digital technology for students within the school environment. Education Central|Pokapū Mātauranga (2018b) describes BYOD as a way for schools to offer comprehensive digital literacy programmes and facilitate 21st century learning opportunities. It refers to the practice of students "…bring[ing] their own mobile devices (laptops, tablets, and smartphones) to school and to use those devices to support, research, and to record and present their learning" (Education Review Office|Te Tari Arotake Mātauranga, 2016, n.p.).

In this study, BYOD is explored from the perspective of the value added of a digital device to the students learning experience. It also includes the learning opportunities presented to students to increase their digital confidence in the preparation for their post school pathways.

1.2.1.2 Digital competence

Spante et al. (2018) identifies that digital competency is often used synonymously with digital literacy, and while these two concepts both contradict and complement each other in the literature, there are instances where digital competence is underpinned by digital literacy. Hong and Gardner (2018) propose that if a student is not digitally competent, they are not prepared to participate in digitally focused learning opportunities. In this study, the achievement of digital competence is underpinned by the demonstration of digital literacy. Digital literacy includes the skills, knowledge and strategies (Netsafe, 2015a) to be "discerning and critical; able to locate, understand, organises, evaluate and adapt digital contents" (Te Kete Ipurangi, n.d., para. 2). The concepts of digital competence and digital literacy cannot exist is isolation as digital competence encompasses the effective use of digital technologies underpinned by an understanding of the implications and effects of digital technologies on the socio-cultural landscape (Falloon, 2020).

1.2.1.3 Digital confidence

This study is focused on the confidence aspect of digital citizenship and self-regulated learning. Digital confidence is complex and multifaceted, self-determined and focused on the ability of both students and educators having a level of self-assurance to be able to engage with digital technologies for the specific purpose of teaching and learning (Passey et al., 2018). According to Passey et al. (2018) digital confidence incorporates the ability to easily use digital technology across a range of contexts including education, social participation and social presence in an agentic, empowering way. Research has shown digital confidence is important in the development of digital competence. High confidence levels using digital technology has been associated with high levels of digital competence (Lucas et al., 2021).

Confidence is described by Park (2017) as a "precondition of digital engagement" (p. 96) and that the ability to learn digital skills and strategies and adapt a constantly transforming digital environment is fundamentally related to digital confidence. Digital confidence is the key to participation and engagement in the digital environment and, unlike competency, is not a skill that can be measured. The presence of confidence determines one's capacity to be able to effectively achieve digital literacy (Park, 2017). This study takes the view that confidence is an attitude that underpins the behaviour Yr13 students, UG students and UG lecturers need to possess to be prepared to be able to participate in the DLE with a degree of competence.

1.2.1.4 Digital learning

As explained earlier in this section, many of the digital terms adopted at the inception of this research have evolved. At the commencement of this study digital learning was described as e-learning and described by Benta et al. (2014) as an approach that involves students engaging with a learning platform to meet their learning requirements. This research was guided by this premise and informed by the NZ MoE perspective of e-learning. In the NZ Curriculum e-learning is described as “learning that is supported by or facilitated by ICT” (MoE, 2007, p. 36) and this study takes the position of Parkes et al. (2015) that e-learning occurs through the use of a learning management system .

While e-learning is the term that is utilised by the NZ school system, the NZ Tertiary Education Commission| Te Amorangi Mātauranga Matua (2020) utilises the term online learning to describe the process of digitally focused tertiary teaching practice. The terms e-learning and online learning are discussed interchangeably in the literature which can contribute to a lack of clarity regarding what constitutes a DLE (Nortvig et al., 2018; Rodrigues et al., 2019; Singh & Thurman, 2019). To provide reader clarity and context for this thesis, the terms e-learning and online learning are considered subsets of digital learning. Digital learning is described by Kumar Basak et al. (2018) as requiring “a combination of technology, digital content and the instruction” (p. 201). As such, digital learning will be used in this thesis to capture the broadness of DLE’s across the NZ secondary school and tertiary sectors.

1.2.1.5 Digital technology

In the literature, there is a wide range of perspectives regarding digital technology and related terms that are used interchangeably (Han et al., 2016). In this study, digital technology refers to the systems, teaching and learning strategies and resources that enables the teacher across all levels of the NZ education system to facilitate, and the student to participate in, the learning aspects of education. The focus is hardware and educational software and incorporates the terms digital tools, e-technology and edtech. The terms digital technology and digital tools have been utilised in the study questionnaire to capture the different types of digital teaching and learning strategies and resources students have been exposed to during their digital education experience. To provide reader clarity, in this study the term digital technology will be used to capture both the digital technology and digital tools currently being used across the NZ secondary and tertiary education sectors.

1.2.1.6 Preparedness

Preparedness has been defined by Conley (2008) as the students' ability to "succeed – without remediation – in a credit bearing postsecondary institution" (p. 21). It is regarded as the behaviours that students need to be able to demonstrate to be digital learners (Parkes et al., 2015). In general, there is a paucity of literature presenting a NZ context on the topic of preparedness for the DLE. The literature review reveals an under-exploration of the current knowledge addressing the preparedness of students to be successful in the digital environment. Preparedness is described in the literature as both a component of, and separate to, readiness. There are a significant number of studies that refer to the concept of student readiness for the learning environment and on what students have to be to be deemed ready to learn. As a component of readiness, preparedness is presented as relating to the students values and learning styles. Alternatively preparedness has also been described as separate from readiness because, it is proposed that unlike readiness preparedness can be assessed against education standards (Fletcher, 2013; Parkes et al., 2015). According to Alem et al. (2014) and Roddy et al. (2017) these terms are also viewed as interchangeable. However, Parkes et al. (2015) states that being prepared for tertiary education is different than being ready. Parkes et al. (2015) argues readiness is focused on non-academic processes and measures a range of personality descriptors. Descriptors that can be difficult to assess as student personality is an indicator of student satisfaction with, not performance in, the learning experience (Pawlowska et al., 2014). In this study preparedness refers to students having a high level of confidence and are able to participate in the DLE (Kizilcec et al., 2017) in their first year UG studies.

1.2.1.7 *Self-regulation*

Self-regulation considers students' ability to self-manage and successfully navigate their learning experiences (Zumbrunn et al., 2011). It is both purposeful and evident when students are able to demonstrate they are acquiring, and applying, both skills and knowledge to meet their learning needs (Bradley et al., 2017). In this study, the learning needs focus is the students' participation in the DLE. According to Zimmerman et al. (2017) students' ability to demonstrate self-regulation is connected to by their level of confidence. Self-regulation is a multi-faceted construct, and in this study is limited to the component of confidence. The view adopted by the researcher is that students learn to self-regulate throughout their digital learning experiences, and this requires students to demonstrate a level of confidence in their digital abilities (Landrum, 2020).

1.2.2 The Netsafe Digital Citizenship Model

As discussed in the preceding section there is both a diversity and interchangeable application of digital concepts, and their associated terms and definitions within the literature (Iordache et al., 2017). To provide clarity for the positioning of this study the digital concepts that underpin this study have largely been informed by the Netsafe Digital Citizenship Model (Netsafe, 2015a).

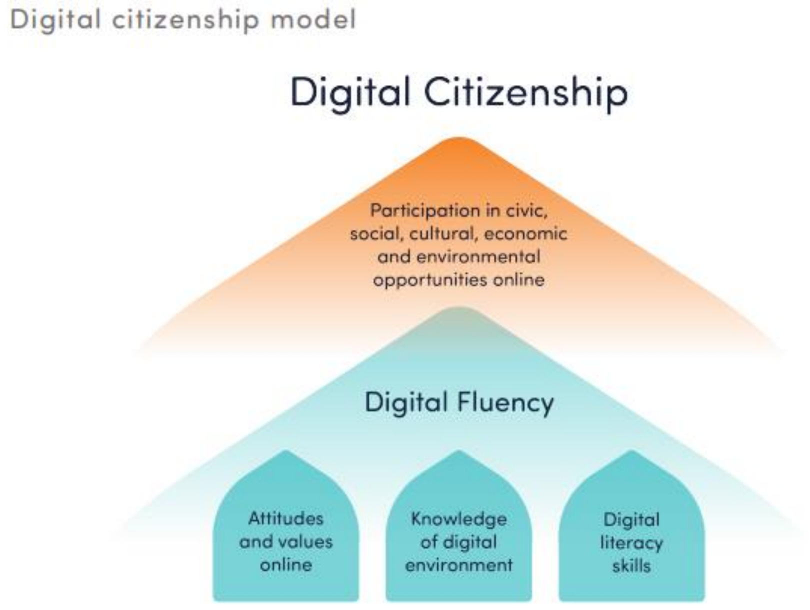
In the past decade, there have been significant changes in the NZ schooling system. These changes have included the way digital technology has been utilised in NZ schools. Netsafe (2015b) describes these changes as moving from a focus of protecting people from technology, to "giving people the skills, knowledge and confidence to maximise the opportunities the effective use of technology can bring" (Netsafe, 2015b, p. 2). As a result of these changes, and "drawing from the Key Competencies and Values in the NZ Curriculum and a growing body of research knowledge" (p. 3) NZ's independent online safety organisation, Netsafe, consulted with NZ primary and secondary school teachers and produced a model of digital citizenship (Netsafe, 2015b). This model was developed to address the interchangeability of related terms and provide clarity for the NZ primary and secondary sector regarding the connections between digital literacy, digital fluency and digital citizenship (Netsafe, 2018). The model also acknowledges the significant changes that have occurred in the NZ schooling system in the past decade. For example, Netsafe (2018) proposed that digital citizenship be integrated into the student experience to improve student preparedness for a digitally enabled society. The Netsafe Digital Citizenship Model focuses on what secondary students need to demonstrate to confidently participate in the DLE and be prepared for the 21st century (MoE, 2007; Netsafe 2015a). The NZ Government recognised that to successfully participate in a 21st century digitally enabled society, students need to demonstrate a level of digital confidence across a range of digital technology (Kaye, 2017).

In 2017, the NZ Curriculum underwent its first major revision in 10 years. The purpose of this revision was to both make explicit and strengthen existing digital technology content while including provision for new and emerging technologies. According to Professor Tim Bell, a University of Canterbury computer scientist, the revised curriculum “helps students move from being mere consumers of technology to being empowered to understand … new technology” (Education Central|Pokapū Mātauranga, 2019, para. 2). While the Government’s aim for the curriculum revision was to support the development of skilled graduates into digital technology related careers, the purpose of the revision was to also provide a framework to prepare students “for a future where digital fluency will be critical for success” (Parata, 2016, para.3). The development of digital fluency enables participation in a digital society (Netsafe, 2015a) and improves digital confidence as students are able to engage with digital technologies for the specific purpose of learning (Passey et al., 2018) in the post-secondary school environment. Digital confidence is important for UG study as students need to be able to effectively use digital technology to achieve their academic aspirations (Eri et al., 2021).

This study explores the preparedness of NZ Yr13 biology students for the first year UG DLE. As such, the definitions of digital literacy, digital fluency and digital citizenship used in this study are informed by those used in the Netsafe's Digital Citizenship Model. In this context, digital literacy is considered fundamental to digital citizenship. For students to begin the process of developing their digital citizenship they must possess the digital skills and strategies to be able to access digital content for the purpose of learning. Digital literacy is seen as an achievable competency of digital fluency, along with knowledge of the digital environment and attitudes and values related to personal integrity and the development of positive online connections. Finally, digital citizenship, the goal of the NZ Curriculum, is regarded as the achievement of digital fluency and results in the full participation in a digitally enabled society (MoE, 2007; Netsafe 2018). It is expected NZ secondary school students, when they progress to tertiary study, will have achieved a level of digital citizenship to be empowered, confident users of digital technologies. This will enable the supporting of their preparedness for the UG DLE. The Netsafe Digital Citizenship Model and the relationships between digital literacy, digital fluency and digital citizenship are illustrated in Figure 1.2.

Figure 1.2.

Netsafe Digital Citizenship Model



Note. From "*From literacy to fluency to citizenship: Digital citizenship in education*" by Netsafe (2018). CC BY-NC-SA 3.0 NZ

The Digital Citizenship Model was developed in response to the changes that were occurring in, and the recognition of the growth of digital technology in the NZ education system (Netsafe, 2015b).

1.3 Research Question, Research Aims and Sub-questions

Students today need to be both prepared and confident for the DLE (Martin et al., 2020). This study was carried out to examine the perceived level of digital preparedness and confidence of Yr13 biology students for the digital learning expectations of the NZ tertiary sector. It is this level of student preparedness for the DLE that has led to the question that underpins this research: **How prepared are Yr13 biology students for digital learning expectations of the New Zealand tertiary sector?** The sub-questions that seek to answer this question are as follows:

1. What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?
2. What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?
3. What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?
4. What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?
5. What do health science UG lecturers require to support students for the DLE in UG study?

This study is designed in three parts to answer the overall research question and sub-questions. Specifically, the aims of this research study are:

1. To examine the level of exposure to, perceived level of confidence with, and factors that influence engagement with digital technology, the perspectives of Yr13 biology students were sought through questionnaires. In order to provide Yr13 students with an understanding of the context for the study, an online learning resource was developed specifically as a strategy to provide students the opportunity to reflect on a digitally focused learning experience via a learning management system. Data from the students was analysed and thematically coded and presented in Chapter 4, Section 4.2 in answer to research question 1: *What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?*

   As the opportunity for students to develop digital preparedness has been linked to the implementation of bring your own device (BYOD) policies (Saponaro, 2014), the students experience of BYOD has been presented in Chapter 4, Section 4.2 in answer to research question 2: *What were the* *perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?*

2. To explore the level of digital preparedness of first year UG students for the digital learning expectations in tertiary education, a questionnaire examined the students' experience of utilising digital technology for the specific purpose of learning within their course of study. Data from the students was thematically coded and presented in Chapter 4, Section 4.3 in answer to research question 3: *What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?*
3. Finally, the perspectives of health science UG lecturers' expectations of the level of digital preparedness required of their respective students were sought through an asynchronous focus group. Data from the health science UG lecturers was thematically coded and presented in Chapter 4, Section 4.4 in answer to research question 4: *What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?*

    The opportunity for students to develop their preparedness for the DLE is linked to their educational exposure to digital technology. As this exposure is influenced by the UG lecturers' ability to utilise digital technology to support student digital preparedness (Hatlevik & Hatlevik, 2018), the UG lecturers experience of implementing a digital teaching format has been presented in Chapter 4, Section 4.4 in answer to research question 5: *What do health science UG lecturers require to support students for the DLE in UG study?*

1.4 Significance of this Study

From the time when the Native Schools Act was passed in 1867, the establishment of NZ's first university in 1869, followed by the passing of the 1877 Education Act, the education system in NZ has been constantly evolving (Tearney, 2016). In recent years the progression of secondary school students into UG study has been recognised as a concern in NZ (Tapaleao, 2014; Thomas et al., 2010). There is both international and national concern that students progressing from secondary school to tertiary education are unprepared and may lack the digital skills, knowledge and strategies required to effectively and efficiently utilise technology for learning purposes (Anthonysamy et al., 2020; McGarr & McDonagh, 2019; Shopova, 2014). The aim of this research is to contribute to the literature with a view to supporting the progression for secondary students into the digital learning expectations in tertiary level study.

The new knowledge gained from this study will contribute to a better understanding in the secondary and tertiary sectors by providing them with insight into how students view their preparation for the UG DLE and the factors that impact on this progression. Furthermore, this research also provides insight into the challenges for UG lecturers as they continue to navigate their transition into the digital teaching space.

1.5 Organisation of Thesis

This thesis is organised into six chapters. In this chapter, an introduction to the thesis has been presented. It identified the rationale of the study (Section 1.1), delimited the study scope and definitions, including the digital concepts that will inform the ensuing chapters (Section 1.2), posed the research question, research aims and sub-questions that that guided this study (Section 1.3), outlined the significance of this study (Section 1.4), and concluded with an overview of how the thesis is organised (this section).

Chapter Two presents the conceptual framework for the study. It provides a review of the literature addressing student preparedness for tertiary study digital delivery requirements, the development of the NZ digital curriculum, digital difference as it relates to digital exposure, and educator digital preparedness to deliver digitally focused learning opportunities.

Chapter Three describes the framework for the research design used in this study. An explanation of the constructivist worldview and the interpretivist philosophy that underpinned this study is provided. The qualitative research approach and the case study research study is described. The methods implemented to collect the data, the sample construction and the data analysis method, thematic analysis, to analyse the data are discussed. Finally trustworthiness and authenticity and the ethical considerations are explained

Chapter Four presents the results of the thematic analysis of the study's findings from the questionnaires, asynchronous focus group and the frequency data from the learning management system (LMS). The main themes and related sub-themes that emerged from the data analysis for each participant group are discussed in detail.

Chapter Five provides a discussion of the results of the thematic analysis, by summarising and synthesising the findings discussed in the previous chapter. The themes and similarities the between the themes that emerged from the data of the three participant groups are discussed in relation to the research questions.

Chapter Six systematically relates the overall findings to the overarching research question and sub-questions. From these conclusions emerge the limitations, recommendations and implications for future research.

Chapter 2 Literature Review

Introduction

This research was undertaken across the secondary and tertiary sectors of the NZ education system and is informed by the Netsafe Digital Citizenship Model. This document focuses on what students need to demonstrate to fully participate in a digital society (Netsafe 2015a). A focus that is consistent with Parkes et al. (2015) view that to be successful in the DLE students need to be prepared.. In this study preparedness refers to students having a high level of confidence to be able to participate in the DLE (Kizilcec et al., 2017) in their first year UG studies. These behaviours incorporate the knowledge, skills and attitudes students require as digital learners (Parkes et al., 2015)

This chapter discusses the multifaceted nature of student preparedness for the DLE, as supported by literature on this subject. The first section (Section 2.1) presents the visual representation of conceptual framework of the study, and includes the researcher's explanation of the integration of the key constructs and concepts related to the preparedness of NZ secondary school students for first year UG study. The preparedness of students for the UG DLE is presented in Section 2.2. Section 2.3 outlines the role of the digital curriculum in developing digital confidence and preparedness. The concept of digital difference and its impact on digital confidence and student preparedness is discussed in Section 2.4. The chapter concludes with a summary in Section 2.5.

The integration of digital technologies into the education sector through curricula is essential as students need to have exposure to digital learning opportunities to develop their digital confidence (Education Review Office|Te Tari Arotake Mātauranga, 2019). While Matos et al. (2019) identified that the integration of digital technologies into curricula poses a concern for educators, Williams et al. (2017) recognised that this integration has supported the education sector to transition from a transmission model to inquiry-based learning. The inquiry-based learning model emerged from a constructivist position where students are viewed as active participants in the learning process. Their role in their learning journey has changed and the presence of digital technology in education settings provides a tool for students to be able to actively engage with learning content (Buckner & Kim, 2014). This inquiry-based learning also supports the development of self-directed learners (van Uum et al., 2017), which is recognised an essential skill for tertiary studies (Tekkol & Demirel, 2018). The successful integration of digital technology into the NZ learning environments are viewed as both essential and necessary to strengthen the student learning experience (Bolstad, 2017). However, there is both international and national concern that students progressing from secondary school to tertiary education are unprepared and may lack the digital skills, knowledge, strategies required to effectively and efficiently utilise technology for learning purposes (McGarr & McDonagh, 2019; Shopova, 2014). Parkes et al. (2015) uses the concept of preparedness to describe the skills, knowledge and strategies students need to be able to be effective learners in the DLE. Student under-preparedness for UG studies has been identified as a factor that affects both student success and the resulting student attrition-rates (Fomunyam, 2020). Furthermore, being under-prepared for the DLE has been attributed to having a negative impact on student wellbeing, as students are unable to achieve their learning goals (Handel et al., 2020).

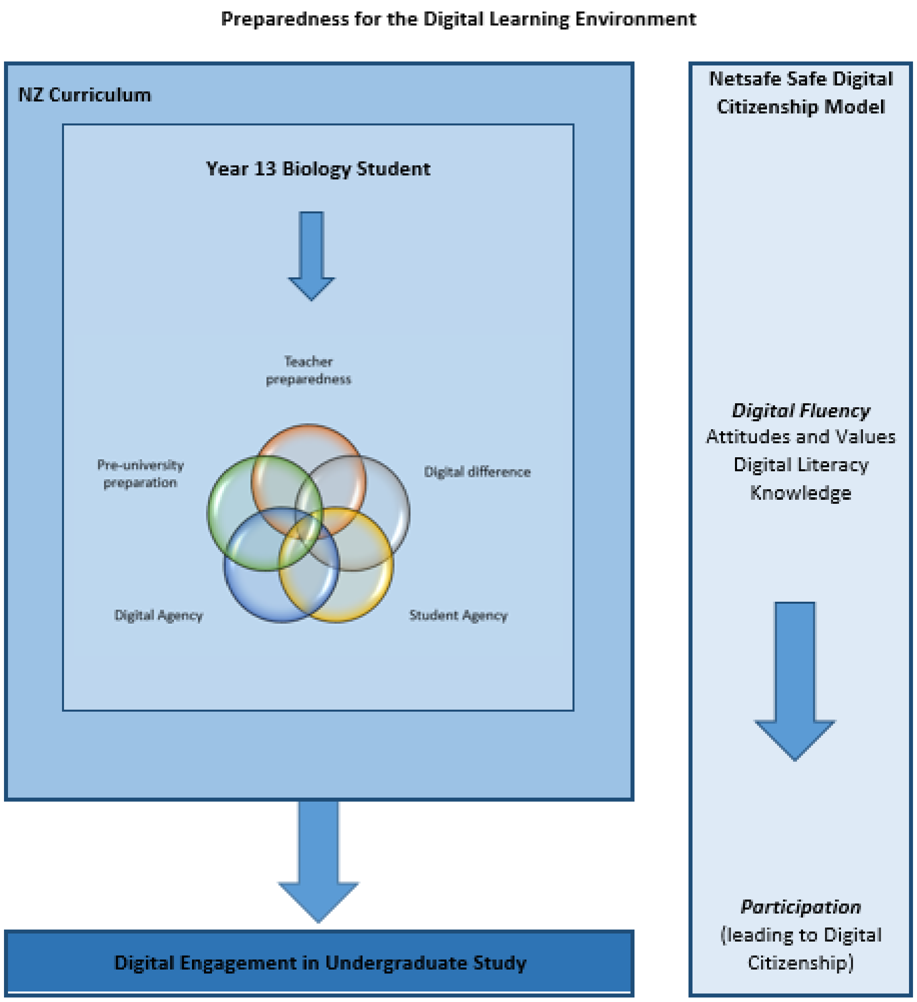
As explained in the Chapter 1 Section 1.2.1, in order to provide reader clarity of the digital terms used in this thesis, the following digital concepts will be utilised in this chapter to capture a range of associated concepts present in the literature: digital competency; digital confidence; digital difference; digital learning and digital technologies.

2.1 The Conceptual Framework of the Research Study

Adom et al. (2018) describes a study’s conceptual framework as an essential component of a research project in that it “grounds it [the research] in theoretical constructs” (p. 438). The development of the conceptual framework is an iterative process. The framework demonstrates the researcher’s explanation of the integration of the key constructs and concepts of the research problem being explored (Berman & Smyth, 2015). In terms of this study, this research is positioned in the NZ education system and as identified in Section 1.2.2 of the Chapter 1, has been informed by the Netsafe Digital Citizenship Model (Netsafe, 2015a). At the time of undertaking this research, to the researcher's knowledge, there were no existing conceptual frameworks available that captured the constructs within the NZ environment being explored in this study to assist the researcher to explore the phenomenon being investigated. According to Grant and Osanloo (2014) the conceptual framework an important component of the research architecture and identifies the relationship between the study variables and core concept. Therefore, to enable the reader to understand the relationship between the main constructs, concepts and context of this study and the connections to the Netsafe Digital Citizenship Model (Netsafe, 2015a) the study conceptual framework was developed (Figure 2.1). Adom et al. (2018) describes this process as the development of the diagrammatic representation of the interconnectedness of the study constructs.

Figure 2.1.

Conceptual Framework of the Research Study



This framework illustrates the progression of the Yr13 biology student as they prepare for their post school pathways and is focused on the UG option. As the Yr13 student progresses through their final year of secondary school they experience an interplay between factors that impact on their ability to engage with the DLE, and the development in their digital fluency as defined by the Netsafe Digital Citizenship Model (Netsafe, 2018). These impactors include, but are not limited to, teacher preparedness, student agency, digital agency and digital difference. For students considering entering the UG post school pathway pre-university preparation is also an important component of their journey. The Government expects secondary school students to be able to enter tertiary education with a level of pre-university knowledge for the tertiary sector to build on (Te Kete Ipurangi, 2018). An awareness of these factors, from both teachers and students, facilitates the consideration of the development of strategies with a focus to balance their impact. The successful embedding of these strategies will enable Yr13 students to develop their digital fluency to a level that will support the seamless progression into their UG DLE. When this progression is successful, students are moving toward achieving digital citizenship as they are able to confidently participate in the digital learning opportunities that the UG environment offers. Furthermore, in the case of first year UG students, tertiary education already expects students to be digitally fluent and to possess a level of preparedness for the digital expectations of an UG degree programme. The recognition of factors that have had an impact on the UG student's digital fluency journey provides the opportunity for tertiary educators to strengthen DLE support so students can successfully transition into, and confidently manage, UG digital expectations.

The identified focus areas for digital literacy and digital fluency of skills and strategies, knowledge, attitude from a confidence perspective and participation are drawn from the definitions of the Netsafe Digital Citizenship Model (Netsafe, 2015a). This conceptual framework (Figure 2.1) has also informed the development of the data collection methods for this study described in Section 3.4 of this thesis.

2.2 Student Preparedness for the DLE

Digital technology has shaped the education environment and provided new opportunities and approaches for students to participate in their learning (Akbar, 2016). According to Spektor-Levy et al. (2017) the education sector needs to ensure the learning environment is preparing students for a digital future. In the NZ context this DLE is informed by the four core aspects of the Netsafe Digital Citizenship Model (Netsafe, 2015b) of participation, attitude, skill and strategies, and knowledge. In terms of the NZ digital learning experience these core aspects ensure students have the skills, strategies, knowledge and attitude to be able to successfully participate in the digital environment (Netsafe, 2015a).

Inquiry-based learning provides students with the opportunity to "develop their ability to work in complex and unpredictable environments making them more critical learners and agentic learners" (Suarez et al., 2018, p. 38). Digital technology has an important role in inquiry-based learning as it supports students to achieve their learning outcomes (Hofhues, 2019; Nocar et al., 2019). The successful integration of digital technology into the NZ learning environments has been acknowledged by Bolstad (2017) as being both essential and necessary to strengthen the student learning experience. For NZ students to be "well prepared to thrive and succeed in a digital world" (para.1), the NZ education system needs to provide students with opportunities to develop their digital skills, knowledge and strategies and confidence. Netsafe asserts these are foundational to being able to participate in a digitally focused society, which is a goal of the NZ Curriculum (MoE, 2007; Netsafe 2018). For secondary school students who are progressing into tertiary studies, tertiary education expects students to be well prepared and possess a level of preparedness for the digital expectations of an UG degree programme (Emerson et al., 2014). Coldwell-Neilson (2018) describes this expectation as the assumption by tertiary educators that students will have acquired the skills, knowledge and confidence required during secondary schooling "to negotiate [the] digitally enhanced learning environment" (p. 103). This has been described by Selwyn (2016) as "self-responsibilization" (p. 1017) where tertiary educators expect students to be active learners, utilising the DLE's resources to develop their understanding of the course content. However, first year UG students have indicated they feel unprepared for tertiary study. A degree of this unpreparedness has been attributed to their expectations of how the learning will occur (Bowles et al., 2014; Hassel & Ridout, 2018; Sotardi & Friesen, 2017).

The following sections discuss the factors that have an impact on student preparedness for digital learning. Section 2.2.1 discusses the constructs of student agency while Section 2.2.2 addresses the impact of digital agency.

2.2.1 Student agency

The first factor to be discussed that has an impact on student preparedness for the DLE is student agency. According to Prakasha et al. (2020) student agency is "now becoming the default expectation" (p. 6511) of students and includes preparedness. Preparedness has been defined by Conley (2008) as the students' ability to "succeed – without remediation – in a credit bearing postsecondary institution" (p. 21). It is regarded as the behaviours that students need to be able to demonstrate to be digital learners (Parkes et al., 2015). While there are many factors that influence the preparedness of students to be able to successfully engage with their studies, preparedness requires students to have a high level of confidence, and are able to self-regulate their learning experiences while participating in the DLE (Kizilcec et al., 2017). However, Perin (2018) identifies there are challenges for education providers to determine the requirements for student preparedness as there are no agreed criteria.

Preparedness is an aspect of student agency that encapsulates the multifaceted aspects of what the student brings to the education experience. Student agency has been acknowledged by Mercer (2012) as a hypothetical and complex construct that is "…not only concerned with what is observable but it also involves non-visible behaviours, beliefs, thoughts and feelings…" (p. 42). Prakasha et al. (2020) describes student agency as relating to students who are proactive and ready to participate in their digital learning. However, to be able to participate in digital learning students need to be both confident and prepared (Kizilcec et al., 2017), they need to be able to demonstrate the behaviours needed to be successful learners in the DLE (Parkes et al., 2015)

Student agency is a term that has been embedded in NZ's official teaching and learning policy document, the NZ Curriculum's key competencies to describe the student's ability to act and make choices concerning their learning. From a digital learning point of view the expectation from the MoE is that education providers will meet the needs and interests of the student through the use of digital technologies (MoE, 2014a). Furthermore, the MoE (2014a) has determined the inclusion of digital technologies to promote student agency will result in NZ secondary school students developing; ownership of their learning, and self-regulation skills. Conley and French (2014) refer to this as the students' capacity to own their learning, and includes the students' "motivation and engagement, goal orientation and self-direction, self-efficacy and self-confidence metacognition and self-monitoring and persistence" (p. 1020). This view of student ownership is essential for preparedness and one of the key indicators of success for tertiary studies. Students who experience control over their learning are not reliant on the educator presence to meet course requirements (Conley & French, 2014; Gaertner et al., 2016). As a result students experience an increased level of education success (Toshalis & Nakkula, 2012).

The DLE encapsulates a wide range learning experiences across the education sector both nationally and internationally. Digital learning is used to describe learning experiences that are facilitated by digital technology and includes, but is not limited to, computer-mediated, online learning, blended learning and e-learning. While ownership of learning is a feature across the range of student learning experiences, including traditional face-to-face delivery, in a DLE ownership of learning includes students being able to demonstrate their role and responsibilities as digital learners (Conley & French, 2014). Student ownership of learning in the digital environment is important as the role of a digital learner is significantly different from traditional face-to-face delivery (Conley & French, 2014). Students may need to modify their assumptions of how learning will be facilitated through learning management systems to meet the role requirements for the digital space. To be a successful digital learner requires students to be motivated, independent learners (MoE, 2014a). There are a number of views in the literature regarding the attributes required for success as a digital learner. Comer et al. (2015), for example, identifies student interactivity and self-directedness as prerequisites for success in the DLE (see also Conley and French (2014); Gaertner et al. (2016)). According to Guiney it is the "learner[s] attitudes and beliefs [that] are important predictors and determinants of student success in e-learning" (2012, p. 12), while Taipjutorus et al. (2012) propose that students with a high level of belief in their abilities in the DLE are more likely to persist with their digitally focused learning goals.

As agentic learners, students have the ability to adapt to their role as digital learners and accept the responsibilities that digital learning encompasses, including the sociocultural context of learning. They develop their understanding of how to apply the required competencies to navigate, and experience success, in their learning environments and as they progress into their post school pathways (Core Education|Tatai Aho Rau, 2014; Klemenčič, 2017). The NZ Curriculum provides students with opportunities to take ownership of their learning, develop key competencies, including digital competencies, to fully participate in their digital learning experiences. The development of agency is important to the student learning experiences. Roman et al. (2016) found, for example, that students who take responsibility for their learning have positive learning experiences. Furthermore, these positive learning experiences have also been connected to a student's level of preparedness for tertiary studies. Roman et al. (2016) assert that "students who are better prepared for the higher education setting have better learning experiences" (p. 32).

Preparedness is regarded as the behaviours that students need to be able to demonstrate to be digital learners (Parkes et al., 2015) and, as explained, has been attributed to improved learning experiences for students (Roman et al., 2016). As an academic performance measure, preparedness focuses on competencies and the skills, knowledge and abilities that are required to enable students to demonstrate a level of academic proficiency. Competency attainment is underpinned with observable and measurable indicators and as a result of this objective focus the evaluation of student preparedness is enhanced (Parkes et al., 2013). The importance of preparedness cannot be understated. Preparedness has been described as a critical factor of student success in tertiary education. Jansen and van der Meer (2011) identify preparedness as being one of the main factors that impact first year UG student attrition rates. In their study of NZ and Norwegian pre-university students Jansen and van der Meer reported 70% of students surveyed felt they had been well prepared for tertiary studies during their secondary school education. While this study did not include a digital component, Jansen and van der Meer (2011) identified the mastery of a range of academically related skills as an important aspect of student preparedness. The importance of skill acquisition as a precursor of academic success is supported in the literature (Blayone et al., 2018; Dray et al., 2011).

There is limited research available that addresses the concept of preparedness for UG students in a DLE. According to Parkes et al. (2015) the literature is primarily focused on what traits and characteristics students need to possess (Hung et al., 2010; Lin et al., 2016; Smith, 2005) rather than the behaviours that students need to be able to demonstrate to be digital learners (Parkes et al., 2015). Preparedness relates to students' values and learning preferences and can be assessed against education standards (Fletcher, 2013; Parkes et al., 2015). Gay (2018) describes a student who is digitally prepared as demonstrating motivation, independence and digital technology eagerness. Parkes et al. (2015) describe student preparedness as "what students need to do" (p. 3) to be successful in the DLE. As this study is informed by the four core concepts of the Netsafe Digital Citizenship Model (Netsafe, 2015b) of skills and strategies, knowledge, attitude and participation, for the purpose of this thesis, preparedness is defined as students having a high level of confidence, are able to self-regulate their learning experiences while participating in the DLE (Kizilcec et al., 2017) and incorporates the skills, knowledge and attitudes students require as digital learners (Parkes et al., 2015).

There are a significant number of studies that focus on what UG students need to be to be ready for tertiary study (Blayone et al., 2018; Doe et al., 2017; Lin et al., 2016; Martin et al., 2020; Ponce-Lugo, 2017; Smith, 2005). However, Parkes et al. (2015) point out that being prepared for tertiary education is different than being ready.

2.2.2 Digital agency

The second factor to be discussed that has an impact on student preparedness for the DLE is digital agency. Digital agency is described by Passey et al. (2018) as "consisting of digital competence, digital confidence and digital accountability … the individual's ability to control and adapt to a digital world" (p. 426). In terms of preparedness for the DLE, for students, the presence of digital agency encourages the confident interaction with digital technology. It is important students are prepared for the digital learning experience and essential that they are able to demonstrate the skills, knowledge and strategies required to be able to fully participate in digitally focused learning experiences. Today it is "inconceivable that digital technology will not be a key component in future-focused learning" (Newton, 2018, p. 9) and there is an increasing presence of digital technologies in the NZ education system. Altbach et al. (2019) describes this increasing presence as a revolution that has had a profound effect on the student experience.

The associated increase in the amount of learning facilitated by digital technology requires students to develop their digital skills, knowledge and strategies to enable them to adjust to the evolving pedagogical changes occurring in the education sector (Scott, 2015). To understand the evolving pedagogical changes that are occurring, digital agency has been proposed by Passey et al. (2018) as the relationship between the digital components of a digitally enable world. As students' progress from secondary school to first year UG studies digital agency enables students to utilise the skills, knowledge and strategies they have developed during their secondary school experience to make the necessary adaptions to successfully and confidently participate in their UG DLE.

2.2.2.1 Digital confidence

Digital confidence is complex and multifaceted, and is focused on the ability of both students and educators having a level of self-assurance to be able to engage with digital technologies for the specific purpose of teaching and learning (Passey et al., 2018). It is an important component of a student's ability to adapt to the DLE. Shonfeld et al. (2017) describe digital confidence as the student's capacity to "handle [digital technology] in different contexts" (p. 42). There is an expectation in tertiary education that today's students are able to confidently participate in and engage with digital technology in the education context for the purpose of learning. However, research has shown student digital confidence with digital technology decreases as they progress through their secondary schooling. This has been attributed to their level of exposure to digital technologies in their secondary school learning environments (Goriss-Hunter et al., 2021). Bulfin et al. (2016) and Passey et al. (2018) propose that there needs to be a change in the perception that because today's students are able to intuitively use digital technology in their social context they possess a level of digital confidence that enables participation in the DLE. Digital confidence requires individuals to be able to seamlessly use digital technology across a range of contexts which includes both their education, and social contexts (Passey et al., 2018). There is an assumption that the demonstration of confidence using digital technology in their social contexts equates to preparedness for the education DLE which has an impact on student digital learning experience.

Preparedness is regarded as the behaviours that students need to be able to demonstrate to be effective digital learners (Parkes et al., 2015). Students who are unable to demonstrate these behaviours are considered not properly prepared for the DLE and their engagement and participation in digitally focused learning opportunities is negatively impacted (Maini et al., 2021). However, when students are observed using digital software and hardware with confidence in their social context, there is a risk that unpreparedness to utilise digital technology for the specific purpose of learning may not be recognised (Passey et al., 2018). Bulfin et al. (2016) identified that students do perceive a lack of confidence using digital technology for the purpose of learning and they want to be supported by educators to develop their confidence and ability to participate in a digitally focused learning environment. Digital confidence is important for students to be able to fully participate in, what is rapidly transforming into, an increasingly digital learning space. Furthermore, student exposure to the DLE is needed to enable students to improve their levels of digital confidence using digital technology for the purpose of learning (Goriss-Hunter et al., 2021).

Confidence is described by Park (2017) as a "precondition of digital engagement" (p. 96) and the ability to learn digital skills and strategies while adapting to a constantly transforming digital environment. As a student's digital confidence improves so too does their participation and achievement in a DLE (Hart et al., 2019). Bergdahl et al. (2019) have identified "students with high levels of digital skills display a variety of pro-learning ways to engage in TEL (Technology-Enhanced Learning)" (p.973). Conversely, where there are concerns regarding a student's level of digital skills, knowledge or strategies to effectively and confidently participate in digitally focused learning opportunities, students are more likely to use digital technology as a distraction tool. Digital distractions were found to be a significant impactor on student digital confidence development as they draw the student's attention away from learning. While they are frequently viewed as the negative effect of the availability of digital technology in education, the engagement in digital distractions could be the result of student disengagement in learning (Bergdahl et al., 2019). To improve digital confidence students need to be engaged in and experience well designed learning opportunities to enable the development of their digital skills and knowledge.

2.2.2.2 Digital competence

The concept of digital competency first appeared in general literature in 2006 and in research findings and policy from 2010 (Spante et al., 2018). Digital competency is often used synonymously with digital literacy and, as a result, these two concepts both contradict and complement each other in the literature. However, digital competence is also described as being underpinned by the demonstration of digital literacy and there is recognition that the two concepts cannot exist is isolation (López-Meneses et al., 2020; Spante et al., 2018). Digital competence is both complex and multifaceted and encompasses the effective use of digital technologies underpinned by an understanding of the implications and effects of digital technologies on the socio-cultural landscape (Falloon, 2020).

The development of digital competency will enable students to achieve the level of digital fluency required to fully participate in a digital society. Digital competency and its application to the education sector is widely discussed in the literature (Blayone et al., 2018; Duncan-Howell, 2012; Parkes et al., 2013; Parkes et al., 2015). The perspectives are both varied and context dependent. While digital competency and associated concepts have been discussed from an interchangeable perspective (Rokenes & Krumsvik, 2014), Rizza (2014) acknowledges "different denominations are found in the literature such as digital competences, digital skills, e-competences or e-skills, and twenty-first century skills or competences. These denominations refer to different concepts which are not synonymous" (p. 1).

Digital competency encompasses more than skills, electronic and twenty-first century classifications. Digital competency is acknowledged as "clusters of related knowledge, skills and abilities" (Parkes et al., 2013, p. 777) to enable students to participate in the DLE. Bashkireva et al. (2020) includes confidence a component of digital competency. Nonetheless, it is a dynamic concept, which cannot be defined for perpetuity at a particular point in time and is constantly changing in order to remain in step with our technological, educational and social-cultural contexts. This process of evolution is important to ensure students develop the skills, knowledge and confidence to be able to participate in, and are prepared, for their digitally focused futures (Falloon, 2020; Kaufman, 2013; Scott, 2015).

Today, students who do not have a level of digital competency to navigate the digital landscape are unable to fully participate in the UG education experience (Nikula, 2017). Concern has been expressed by the tertiary sector that students progressing from secondary school to tertiary education may lack the digital competencies required to effectively and efficiently utilise technology for learning purposes (McGarr & McDonagh, 2019; Shopova, 2014). This concern may be influenced by the overgeneralisation of the digital competence of students today. The assumption is that digital competency is determined by the consumption of digital technology of students today, not the ability to utilise digital platforms for the purposes of learning (Engen et al., 2013). This assumption is acknowledged by Skov (2016) in the development of the Digital Competence Wheel. Skov (2016) identified that the overconsumption of digital technology led to the ability to utilise digital technology only at an operational level through the demonstration of instrumental skills. Instrumental skills are described as digital skills that are operational in nature and narrowly framed with the focus being on the carrying out of digital tasks not the development of digital competence (Eynon, 2020). In this instance, students are unable to develop their digital literacy to the level required to be able to participate in the DLE; that is, while they possess digital skills, they will lack the knowledge and strategies required to be able to fully participate in a digitally-enable society (Netsafe, 2015a).

To be able to demonstrate digital skills, knowledge, and confidence to participate in the DLE students need to engage their higher cognitive abilities and move “from instrumental skills towards more productive, communicative, critical and strategic competences” (Skov, 2016, para.2) that are required to achieve digital competency. However the assumption that digital consumption results in digital competence is complicated by the discipline-specific nature of tertiary education (Duncan-Howell, 2012). There is a mismatch of expectations that is assumed by tertiary lecturers regarding the level of digital competency they believe students entering tertiary education should possess due to students today spending most of their life positioned in digital technology. The Education Hub (2019) refers to this mismatch of expectations as a generalisation that fails to acknowledge the individual levels of digital competence across the student cohort. The view that overconsumption of digital technology contributes to an innate ability of students to negotiate the DLE does not acknowledge the students’ individual digital contexts; a context that is determined by the level of digital interaction the students are exposed to (The Education Hub, 2019).

However, unlike their lecturers, UG students generally have confidence in their digital skills, knowledge and strategies. In their study of 200 UG enrolled in their first online course, Comer et al. (2015) found that students generally perceived they possessed the attributes required for the DLE. Furthermore, in their study on both the student access to, and use of, digital technology by Corrin et al. (2010) found that the majority of first year UG student surveyed expressed moderate confidence in their ability to participate in digital learning. However, there are challenges with students self-reporting their level of digital competency, without the presence of observable and measurable data. In a study on the self-assessment of digital competency Maderick (2013) found, for example, that pre-service teacher education students’ perception of their digital abilities may not be accurate. The subjective nature of self-assessment is subject to participant bias. Additionally, students may not be fully aware of the indicators required by educators to determine their level digital competence for their specific education-digital context (Engen et al., 2013).

In a review of digital competency items across validated and applied instruments, attitudes was the most common factor identified with regard to skills and knowledge featured in 50% of the instruments surveyed (Blayone et al., 2018). Blayone et al. (2018) also identified that there was a lack of consistency evident across the instruments reviewed in how the digital competencies were conceptualised and measured. In their study on competencies required for effective performance in a UG DLE Parkes et al. (2013) identified in the literature that there are six competencies that are considered critical for successful digital learning. These competencies are: student autonomy; self-direction; time management; reflection; computing and internet skills; interaction skills and identity and social presence. Parkes et al. (2013) argued that these competencies are observable and measurable behaviours that are important for student preparedness as they provide the criteria for what students need to do to be successful digital learners. They proposed students who are unable to demonstrate competence in these six areas will be underprepared for digital learning expectations in a UG DLE. The aim of NZ's official teaching and learning policy document, the NZ Curriculum, is for students to develop "broad technological knowledge, practices and dispositions" (MoE, 2007, p. 8) to enable them to fully participate in a digitally focused society. The NZ Curriculum draws on the work of Carr (2006) who describes dispositions as actions-based, where students are ready, willing and able to develop their capabilities.

Students today exist in a world that is continually redefining itself. Through this constant redefinition of the education context students need to be remain abreast of new knowledge (McNeill et al., 2012). Undergraduate students, and stakeholders, have an expectation through digital learning opportunities that their digital skills, knowledge and strategies will improve during their programme of study and the tertiary sector has a responsibility to extend the digital competency of students (Coldwell-Neilson, 2018; Duncan-Howell, 2012). This is a view that is supported by the NZ Curriculum (MoE, 2007).

2.2.2.3 Digital literacy

Digitally literacy is widely discussed in the literature and described by Coldwell-Neilson (2018) as a term that has “no common understanding of what it means or what skills and capabilities should be captured within it” (p. 103). While there is a recognised lack of clarity associated with digital literacy (Kaeophanuek et al., 2018), it is a skill that tertiary education expects students to possess on entry to UG studies. Furthermore, these expectations are based on assumptions regarding a student’s digital literacy knowledge, including the consideration of their digital consumption (Sadaf & Johnson, 2017). Across tertiary education the expectations of UG lecturers regarding the levels of student digital literacy are not representative of the UG students’ actual digital literacy (Drew & Forbes, 2017; Nocar et al., 2019). Hong and Gardner (2018) discuss that while students have a high level of digital technical skills, their digital literacy skills are not as developed and as a result they are under-prepared for the DLE of tertiary education. This view is supported by Anthonysamy et al. (2020).

The development of a student’s digital literacy is not a passive process. There is a view that the inclusion of digital technologies into a DLE will inherently support the development of a student’s digital literacy. However, Nocar et al. (2019) identifies that students need structured digital learning opportunities to improve the development of their digital literacy. Students need to be supported to make the transition from consuming digital technology to using technology for the purpose of learning. This finding is supported in the current literature (Chan et al., 2017; Kaeophanuek et al., 2018; Tang & Chaw, 2016). All curricula across the education sectors need to include content specifically related to digital literacy development in order to provide students with structured digital learning opportunities. Chan et al. (2017), for example, found that student digital literacy levels increased after participation in a structured and authentic DLE. In a study with UG students, the view was expressed by student participants that both universities and their lecturers are responsible for the digital literacy development of student cohorts. Undergraduate lecturers should have responsibility for providing teaching opportunities and guidance, while tertiary education has a responsibility to address infrastructure issues and provide a learning environment that is able to support this development (Abbas et al., 2019).

Passey et al. (2018) proposes digital literacy as a core building block for digital confidence. Both Abbas et al. (2019) and Park (2017) identify the connections between confidence and digital literacy in the student DLE. Digital literacy is linked to student learning outcomes. Students need to be able to demonstrate digital literacy to confidently and effectively participate in the DLE. Research has found that students who have a high level of digital literacy are able to easily adapt to the DLE (Anthonysamy, 2020; Tang & Chaw, 2016). Conversely, students whose digital literacy is not at a level needed to enable them to take full advantage of the DLE, will experience learning challenges (Hong & Gardner, 2018; Perera et al., 2016). Furthermore, O'Connell and Dyment (2016) suggest that students with low digital literacy levels are not well-prepared for the DLE. This view is supported by Hong and Gardner (2018) who claim that in a DLE low levels of digital literacy results and the associated “lack of preparedness may have a significant impact” (p.2) on student participation. As explained above these challenges are related to academic performance and student retention.

2.2.2.4 Digital disengagement

The NZ Curriculum describes digital literacy as including the skills, knowledge and strategies that are required to be able to fully participate in a digitally-enabled society (MoE, 2007; Netsafe 2018). Within the education sector this participation includes the acknowledgment of factors that can have an impact on student learning, including the presence of digital disengagement. Digital disengagement occurs when digital distractions impact on a student’s ability to participate in digital learning opportunities. Educators often describe disengagement as relating to student traits such as describing students as unmotivated when they are disengaged in learning (Alexander, 2015). However, Park (2017) cautions “against ascribing digital engagement to an individual’s motivation” (p. 99) and that the issue could be related to the quality of the digital access. This quality digital access affects students’ ability to participate in a DLE and includes data plans, shared digital devices and the quality of the data connection (Digital Government, 2021). The preparedness of the educator for the DLE is also a digital access issue for students. Cutri et al. (2020) identified that the assumption all students have equity of digital access can have a negative impact on student participation and achievement. In 2019 it was estimated that 25% of NZ students experienced digital access issues. The introduction of digitally focused learning across the NZ education system during 2020, has identified there continues to be students who are experiencing digital access issues (Forbes, 2020).

The issue of student disengagement in education is widely discussed in the literature. One of the factors that has been identified as attributing to this disengagement is literacy issues (Merga, 2019; Victoria State Government, 2020). In a 2019 study it was found that digital distractions interrupted classroom learning for 80% of study respondents (McCoy, 2020). Students have acknowledged during class that when they are digitally distracted and off-task they are participating in “texting, social media, watching videos, gaming, listening to music” (Self Rykard, 2020, p. 100). Irrespective of the nature of the distraction, digital disengagement could be a result of students not understanding how to use digital technology for the purpose of learning (Drew & Forbes, 2017). This perspective is supported by Khalid and Pederson (2016) who also identified confidence and access to digital learning opportunities as a concern in this area.

In the 21st century the attainment of literacy has evolved from print literacy to the presence of digital devices. Anthonysamy (2020) identified that digital literacy is important in the students’ ability to manage digital distractions and stay engaged in digital learning opportunities. It has been proposed that “digital distraction in classrooms is a symptom of outdated teaching methods” (Langford et al., 2016, p. 8). Furthermore, Langford et al. (2016) states that tertiary education needs to focus on incorporating digital technology into the classroom that enhances, rather than distracts students from, the digital learning experience.

Perera et al. (2016) proposes that when students are able to demonstrate digital literacy behaviours, they are focused in the digital focused learning environment. They are more likely to remain on-task, participating in digital learning opportunities. Furthermore, in their research on an inclusive digital literacy framework Nedungadi et al. (2018) found that after participating in a digital learning opportunity students in their study experienced an increase in confidence in the digital environment and a corresponding change in their behaviour. In terms of preparedness, and being able to confidently participate in the DLE, Chipchase et al. (2017) indicated that under-preparedness for tertiary study can lead to student disengagement, including a lack of participation in the DLE.

2.3 Development of the Digital Curriculum

The NZ Curriculum requires English-Medium state secondary schools to prepare students for the successful transition into their future study and vocational options. The vison of this document is for NZ secondary students to develop the five (5) key competencies of "thinking, using language, symbols and texts, managing self, relating to others and participating and contributing" in order to prepare secondary school students to "live, learn, work and contribute as active members of their communities" (MoE, 2007, p. 12). This transition includes the progression of secondary school students to UG study (Gueudet & Thomas, 2020) and in order to be prepared for this transition secondary school students need digital preparation to enable them to participate in the UG DLE (Rodriquez et al., 2017). The key competencies of the NZ Curriculum are described as the capabilities that are both needed and required for future pathways. The broadness of the document means digital competency is viewed as a fundamental element in the development of the key competencies and Culhane (2014) asserts the development of digital skills, knowledge, confidence and participation (digital citizenship) "is an integral part of this key competency development" (p. 3). .

In 2017, from a survey of 35 countries, NZ's education system was acknowledged by The Economist Intelligence Unit (2017) as the best environment for preparing students for the complexities of the 21st century. In the same year the NZ Curriculum underwent its first major review in 10 years. It was acknowledged that

> The increased awareness (of the necessity to integrate digital technology into the school curriculum areas) will support young people to develop skills, confidence and interest in digital technologies and lead them to opportunities across the diverse and growing IT sector (Barback, 2014, p. 1).

As a result of the review, the MoE has adopted Netsafe’s Digital Citizenship Model to address the interchangeability of related terms and provide clarity for the NZ primary and secondary sector regarding the connections between digital literacy, digital fluency and digital citizenship (Netsafe, 2015a). Two digital technology learning areas were included as mandatory content across all learning areas of the NZ Curriculum: (1) Computational thinking for digital technologies involves students learning core programming concepts so they can become creators of digital technology and (2) Designing and developing digital outcomes is when students learn how to design quality fit-for-purpose digital solutions (MoE, 2007).

These areas have been introduced as purpose outcomes to enable the mapping of student programmes as they develop their digital skills, knowledge and strategies across their learning experiences. Nikki Kaye, NZ Education Minister in 2017, advised it was the expectation of the Government that the NZ education system will be digitally-orientated (Kaye, 2017). The goal of The NZ Curriculum is to provide students the opportunity to develop their digital fluency to become digitally capable learners (Te Kete Ipurangi, 2018). Chris Hipkins, NZ Minister of Education in 2018 said “the digital curriculum [the NZ Curriculum] is about teaching children how to design their own digital solutions and become creators of, not just users of, digital technologies” (Hipkins, 2018, para.2). There is acknowledgement in the literature of the need for an education strategy that strengthens the digital technologies content in the national curriculum so that digital capability is an explicit component of the student learning experience (Fox-Turnbull, 2019). It is through the intentional development of digital capability that students will be able to successfully participate in the emerging trends in the digitalised context of their post-school pathways.

The Government promoted the NZ Curriculum as a future-focus curriculum that prepares students for their participation as digital citizens. Concern has been expressed the 2017 NZ Curriculum revision does not promote a holistic learning experience for students regarding the development of their digital skills, knowledge and strategies and the focus on digital skill development and lacks the vision for the integration of digital technology into the learning environment (Clune, 2017). The focus in education needs to move away from digital skill development and to place greater emphasis on developing students' skills, knowledge and strategies for their post-school contexts (Falloon, 2020).

However, the NZ Curriculum has a competency approach that is greater than academic performance. According to Williamson (2013) a competency approach "emphasizes a 'softening' and an 'opening up' of the curriculum to both the alleged training needs of the knowledge-based economy and the individual needs and interests of children themselves" (p. 24). These themes are evident in the NZ Curriculum document. The NZ Curriculum identifies the anticipated synergies with post-school academic pathways. The expected seamless learning experience as students' progress into tertiary study is captured through the proposed competency alignment across the three tiers of the NZ education system (Te Kete Ipurangi, 2018).

Nonetheless, there are barriers to fully enacting the curriculum. The development of digital competency, student confidence and preparedness requires students have the opportunity to participate in a DLE. Digital access is a necessary component in the development of student digital confidence and preparedness for the DLE. It has been identified by Flanigan and Titsworth (2020) that in the UG classroom where laptops are part of course delivery, students are engaging in non-class activities 40-60% of the time. There has been a view expressed by UG students that it is their right to engage in off-task activities during class (Santos et al., 2018). However, digital distractions may be attributed to an undeveloped level of digital literacy where students do not have the "ability and awareness to use emerging technologies to perform academic tasks online while demonstrating proper online attitude in the digital environment” (Perera et al., 2016, p. 133). This presents challenges with regard to the preparedness of students for the UG DLE.

2.3.1 Tertiary education expectations

The transition from secondary school to UG studies can be a challenging time for students as they move from the familiarity of the secondary school learning environment. Hassel and Ridout (2018) identified when this transition is not managed effectively, there is an increased risk of a negative impact on student academic performance and retention. Students’ expectations of UG study included that the level of lecturer support and presence in the classroom would be similar to their secondary school experience (Kandiko, 2013). There is a tension evident in the literature regarding the differing expectations of students and educators. In their research concerning UG student and UG lecturer expectations Hassel and Ridout (2018) found that UG lecturers expect students to be “independent, self-motivated and self-efficient right for the beginning of their degree” (p. 11).

The preparedness of secondary school students is contributing to uneasiness in the tertiary sector (Fomunyam, 2020). Coldwell-Neilson (2018) claim that the tertiary sector expects students to be digitally literate and to utilise digital technology to participate in digitally focused learning opportunities. To address this issue of preparedness there is a view expressed in the literature that digital literacy needs to be a core component of both the secondary and tertiary curriculums and the responsibility to develop digital literacy is the role of both the secondary and tertiary sectors (Coldwell-Neilson, 2018). However, UG academics have identified the lack of collaboration between the tertiary and secondary sectors regarding the progression of secondary school students into UG study as a factor that contributes to student under-preparedness (Marr et al., 2013). Nonetheless, the tertiary sector continue to hold the view secondary education is responsible for the preparation of students for UG studies (Burke da Silva et al., 2014; Eve, 2011).

This position is also evident in NZ universities (Emerson et al., 2015a; Tapaleao, 2014; Woulfe, 2013). In their research on student literacy and the progression from high school to UG study for first year UG students, Emerson et al. (2014) found independent learning skills was a concern for tertiary lecturers. The ability to participate in independent learning opportunities has been linked to both confidence and to successful education outcomes in tertiary studies (Kingsbury, 2015; van Rooij et al., 2017a). In today's DLE, students are required to "monitor and adjust their behaviour and actions" (Geng et al., 2019. p. 2) to participate in independent learning opportunities. The tertiary sector expects students will be able to manage the independent learning requirements, where the responsibility for learning shifts to the student, from the moment they arrive in their UG programme. Emerson et al. (2014) and Serdyukov and Hill (2013) assert that this is an unreasonable expectation as the students' learning context prior to tertiary studies includes the provision of a highly structured learning environment. In NZ

> …universities expect students to engage as independent learners: first-year courses are commonly large, with many compulsory courses having rolls in excess of 400 students; much course material and support has to be accessed independently online; interaction with teachers is limited (Emerson et al., 2014, p. 4).

Traditionally preparedness for tertiary study has been determined by academic achievement (Chapa et al., 2014). NZ universities have pre-requisite academic entry requirements (Day, 2014; Woulfe, 2013, 2014), and this focus is inconsistent with the NZ Curriculum's competency approach. However, there has been growing concern from voices within the tertiary sector that secondary schools are not preparing students for the expectations of UG education (Woulfe, 2013, 2014). Bowles et al. (2014) identified a degree of this unpreparedness has been attributed to the learning approach in tertiary education and student expectations of how learning will occur, including self-regulated learning requirements. Potentially contributing to this is that students have awareness that learning at tertiary level study will be different to secondary school, but they are unclear as to what the difference looks like (Burke da Silva et al., 2014; Tellioglu, 2014).

The NZ Curriculum document identifies the role of secondary schools in the pre-university preparation for students and the Government expects secondary school education students to enter tertiary education with a level of pre-university knowledge for the tertiary sector to build on (Te Kete Ipurangi, 2018). However, Emerson et al. (2015a) identified that there seem to be no conversations occurring between the secondary and tertiary sectors to support the seamless progression of secondary school students into UG study. As a result, the tertiary sector does not always acknowledge the context in which pre-university learning occurs. The tertiary sector expects students to commence their UG programme with “a pre-determined kete of skills, the learning of which is the responsibility of pre-university teachers” (Emerson et al., 2015b, p. 5).

Unfortunately, this disconnect between the sectors has the potential to disadvantage students in their first year of tertiary study. The tertiary sector is expecting secondary school students to enter UG studies with knowledge of a learning environment they have not experienced (Emerson et al., 2015a). When student challenges arise and progression is not as the tertiary sector expected the responsibility for this perceived lack of preparedness is directed at the secondary sector (Fomunyam, 2020). Coldwell-Neilson (2018) identified that when there is “no shared understanding” (p. 75) of the digital expectations of students on entry to UG study, thus students are unable to prepare for their progression from secondary school into UG study.

Learning facilitated by a LMS is extensively used in the tertiary sector to complement lecture based learning and students need to be able to make the transition to utilising digital technology for learning to experience success at tertiary level (Hattie & Yates, 2014). Russo et al. (2018) suggested that students who are digitally unprepared could experience challenges as they transition into the tertiary sector if they are not supported to adapt to the DLE. A negative consequence of students’ unpreparedness for the DLE are lower student retention rates and the discontinuation of their UG studies (Brooks & Pomerantz, 2017).

van Rooij et al. (2017b) identified that preparedness is an important factor students need to possess to be successful in tertiary education. Furthermore, success in university has been associated with a successful transition from secondary school and van Rooij et al. (2017b) proposed that students with a high level of participation in, and motivation for, digital learning opportunities experience improved success at university. This behaviour aspect has been recognised by Parkes et al. (2015) as what students need to be able to demonstrate to be digital learners to be prepared as they progress into UG study. In addition, student preparedness has been associated with improved retention and qualification completions at university (Fomunyam, 2020).

2.4 Digital Difference

Digital difference was first proposed by Warschauer (2003) to capture the multifaceted nature of the digital divide. Typically this divide is focused on the inequity of access to digital technology (Education Central|Pokapū Mātauranga, 2018a; Radovanović et al., 2015; Starkey et al., 2017; Van Dijk, 2017). However in 2007 Warschauer (2007) recognised the generation gap as a component of digital difference. Warschauer's generation gap is concerned with the digital experience differences between students and teachers. The issue of generational differences in the use of digital technology for learning has been well-documented in the literature (Corrin et al., 2010; Creighton, 2018; Georgescu & Bogoslov, 2017). Education Central|Pokapū Mātauranga (2014), NZ's independent news source for the education sector, also acknowledges NZ teachers may not possess a level of digital competency that will enable them to support the development of their students in this area.

Teacher digital capability is acknowledged as a reoccurring theme in the education sector. A 2018 study undertaken by the NZ Education Review Office|Te Tari Arotake Mātauranga identified the digital capability of teachers as a barrier in the implementation of the digital technology curriculum content in 30% of the 221 NZ schools surveyed (Education Review Office|Te Tari Arotake Mātauranga, 2019). Bruns (2011) has expressed concern that teachers need to build their digital capability to promote a digitally focused learning experience for students; a view that is supported by Georgescu and Bogoslov (2017).

However, Starkey et al. (2017) suggested that discussions regarding teacher capability are influenced by “the Prensky (2001) notion of highly capable young ‘digital natives’ being taught by older, slower ‘digital immigrants’ [which] appears to have contributed to a deficit model of teacher knowledge and skills in a digital age” (p. 32).

A key theme in the discussions regarding the use of digital technology in education in recent times has been the impact of the generation gap between educators and students (Corrin et al., 2010; Lisenbee, 2016). The generation gap in education is not new, it is a distinctive feature of the sector (Van Damme, 2014). The gap is related to, and created by, the use of digital technology and the educators’ ability to effectively use the technology. In a 2016 study investigating the preferences of Generation Z students, Cilliers (2017) found 85% of educators surveyed felt, when compared to their students, that they possessed less digital knowledge.

Irrespective of how the digital difference occurs, the role of the 21st century educator has changed. The goal of the revised NZ Curriculum is that all students are able to demonstrate digital citizenship. This goal requires students to be both digitally literate and digitally fluent. The expectation is that NZ students will demonstrate the skills, knowledge and strategies and possess a set of competencies to fully participate in a digitally-enable society (Netsafe, 2015a). From a MoE perspective this means that “all learners will have the opportunity to become digitally capable” (Te Kete Ipurangi, n.d.-b, para.1). For students to be able to fully realise their digital capability educators today need to be able to demonstrate digital citizenship in action in the learning environment to meet the requirements of the NZ education system (Education Central|Pokapū Mātauranga, 2014). The students’ educational experience is shaped by educators and the digital skills, knowledge, strategies and competencies educators bring to the classroom (Ahram et al., 2011; Ponce-Lugo, 2017). The digital experience of students and educators contributes to digital difference in the DLE (Dolan, 2015; Warschauer et al., 2014).

2.4.1 Equitable digital access

Student digital access is acknowledged in the literature as a multifaceted construct and according to Associate Professor Starkey (2020) "New Zealand has one of the most inequitable education systems in the OECD" (para.5). It is more complex than students having access to a digital device (Starkey, 2017; Van Dijk, 2017; Warschauer, 2003). Student digital access can be impacted by the school context due to the outdated digital infrastructure (Hartnett, 2016). Digital technology is evolving at a rapid pace and the challenge for schools is to keep their digital infrastructure up to date within their current funding constraints to support student learning (Twining et al., 2015). In NZ the MoE has invested in providing ultra-fast broadband in schools. However, there is criticism of the school provided digital devices that are available to NZ students. Digital devices are described as old and slow, and there are not enough devices provided (Peters, 2019). According to research completed by Research New Zealand (ResearchNZ) in 2016 there has been no increase in the ratio of student to school provided digital device of approximately 3:1 since 2011 (Johnson et al., 2017). With the increasing NZ secondary school enrolments over the past 10 years and no significant change in the rates of student owned devices since 2014, these findings suggest there is an increased demand for school-provided devices (Johnson et al., 2017).

The availability of digital devices in the classroom is a concern. To address this concern "Bring Your Own Device" (BYOD) began to be a feature of the NZ schooling system in the 1990's. The first BYOD trial occurred in the secondary school sector in 1996 (Adams, 2015), with the first school in NZ implementing a BYOD policy in 2011 (Parsons & Adhikari, 2016). One of the factors that influenced the implementation of BYOD was to reduce financial pressure for schools to provide devices for every student (Education Central|Pokapū Mātauranga, 2018a, 2018b; Parsons & Adhikari, 2016). However, only half the schools surveyed by ResearchNZ have a policy in place for students to use their personal digital device in the classroom (Johnson et al., 2017). A 2017 study of 290 NZ schools found that while 48% of schools surveyed have a BYOD policy, 34% of the schools surveyed were not intending to implement a BYOD policy in 2018 (Francis, 2018). In terms of student equitable digital access, Bolstad (2017) in her survey to gain an understanding of digital technologies in the NZ school sector found 89% of the NZ schools surveyed that were situated in low socio-economic communities did not have a BYOD policy.

Parsons and Adhikari (2016) identified one of the most important benefits of BYOD was the seamless connection between the classroom and home. However, as NZ guarantees a free education for all 5-19 years olds enrolled in a state school the NZ Education Acts prevents the compulsorisation of BYOD policies (Collins, 2017). In situations where students are unable to own a digital device, the MoE deputy secretary has placed responsibility on schools to ensure “no child’s learning should ever be disadvantaged by a lack of access to technology” (Collins, 2017, para.6.)

The NZ Government is committed to digitally connecting students and “enhancing equity of access to technology beyond the school gate and outside school hours” (N4L, 2018, p. 6). However the lack of access to the internet and availability to a device at home is also a concern (Hartnett, 2016). Connectivity issues at home impact on student learning in two ways. The student who has no connectivity at home will not progress at the same rate as their peers. Additionally, their peers received limited digital guidance in the classroom as, in consideration of digitally excluded students, teachers are unable to fully capitalise on the advantages of digital technology. In 2018 N4L, a Crown company supporting the Government’s goals for education, canvassed 2342 NZ schools, with 450 schools completing the survey. The results identified 52% of respondent schools had 25% of their students with no internet connectivity at home. For students from lower socio-economic communities this figure was higher (N4L, 2019).

Internationally BYOD has also been identified as both a cost saving strategy and an initiative to encourage school – home participation. In their examination of BYOD (referred to as 1:1 laptop programs) in the United States Warschauer et al. (2014) found there were students who experienced greater opportunities for digital participation with BYOD programmes. This finding is also supported by Australian researchers who found the implementation of a BYOD policy provided students with greater opportunities for student-centred learning (Crook et al., 2014). However, Warschauer et al. (2014) identified that there were issues of access for students with lower socio-economic circumstances. Furthermore, Maher and Twining (2017) also proposed that BYOD policies have resulted in digital access and digital equity concerns that will have an impact on a student's level of digital exposure. These findings are consistent with the NZ experience and Dolan (2015) cautions educators and education providers need to proceed with care when drawing conclusions regarding digital access for students with lower socio-economic circumstance as the situation is complex.

2.4.2 Twenty-first century students

Students today are digitally connected and due to this level of immersion with digital technologies educators tend to assume that these students have the required digital literacy capabilities to enable success in the DLE. However, Bullen and Morgan (2015) address the inaccuracies of the generational profiling that educators have applied to 21st century students and the expectations of the education sector. Their research on the implications for digital students in tertiary education identified a continuum of student engagement with digital technology which emerged across both social and education contexts. Bullen and Morgan (2015) acknowledged that 21st century students today display a wide range of digital skills, knowledge and attitudes and that there are a number of factors that impact on their access to digital technologies.

The literature continues to promote a paradigm regarding the expectations of 21st century student digital participation and their level of digital skills, knowledge and strategies (Corrin et al., 2010). This paradigm fails to recognise that 21st century students are situated across a digital continuum. However, according to Hardy (2015), irrespective of their digital experience, 21st century students are "tech-savvy teens, not tech-smart adolescents" (p. 11). These students lack the level of digital literacy required to be able to utilise digital technologies for academic success. Murray and Perez (2014) described this as students "not prepared to cross the bridge between personal and academic use of technology" (p. 88).

Concern has been expressed that the education sector faces challenges as it competes with the students' social context (Badge et al., 2012; Barber et al., 2015; Corrin et al., 2010). In their 2009 findings from a 15 year longitudinal study James et al. (2010) reported that first year Australian UG students spend 30% more of their time using digital technologies for recreational purposes when compared to their educational context. In a Canadian study of students enrolled across science, arts, health and social sciences faculties it was identified that school-unrelated laptop use during class time had a negative impact on academic performance. Furthermore, students enrolled in science programmes were more likely to participate in school-unrelated activities during lectures (Gaudreau et al., 2014). Undergraduate students do acknowledge that there are challenges in managing their social and academic profiles in the digital environment and they feel under-prepared to manage these challenges (Parkes et al., 2015).

Secondary school students also acknowledge these challenges (Feng et al., 2019). James et al. (2010) reported one third of Australian school leavers felt underprepared for the demands of tertiary study. However, the NZ Government expects that all students will possess digital skills and knowledge to be able to positively contribute to their post school pathways, including tertiary studies (MoE, 2010) .

2.4.3 Twentieth century educators

Twentieth century educators are described by Adams and Pente (2011) as needing to navigate and acclimatize to digitally focused education. They have a significant impact in the secondary and tertiary sector in NZ as there is an over-representation of educators in the 40+ age group in the academic workforce and it is predicted that this trend will continue (Morris & Patterson, 2013; Nanna et al., 2010; OECD, 2014). In 2019 the OECD Teaching and Learning International Survey (TALIS) reported that the average age of registered teachers in NZ was 44 and 35% were aged 50 or more. These figures are consistent with the OECD averages of all the countries surveyed (OECD, 2019). Within this group are educators who make the choice not to make the transition to the digital environment and this can impact negatively on the students' learning experience. Howard (2013) proposed that this resistance may be related to educators being risk averse in the domain of technology use and unwilling to change their teaching practice. Teachers who have confidence in their digital skills, knowledge and strategies are more likely to integrate digital technology into their teaching practice as they have a positive response toward technology use.

Claire Amos, a Deputy Principal of a NZ secondary school, argues that the education system in NZ today is developed from the Industrial Age and does not meet the needs of today's students (Barback, 2014). This view is supported by the Desire2Learn Founder John Baker (2014). According to both Amos and Baker throughout the education system there is a wide variation in teaching practices and for some students the educational experience is neither student-centred nor future-focused and continues to focus on the traditional model of education. The challenge for the NZ education system is the successful adoption and integration of digital technology within the secondary sector to enable students to develop the digital competencies required to experience success as they progress from secondary school into UG study (21st Century Learning Reference Group, 2014). This challenge is not unique to NZ and is also evident in the international context (Innovative Teaching and Learning Research, 2011). Amos believes as educators "we aren't actually measuring the right 'things' and if we aren't measuring the right 'things', chances are we are not teaching the right 'things'" (Barback, 2014, p. 29).

Cunningham (2014) and Rossi (2015) identified that one of the main issues for today's students transitioning into tertiary education is the impact of 20th century educators. The literature identifies a disconnect between new and emerging digital technologies and the preferred teaching style of educators. The presence of digital technologies changes the education landscape, and educators need to transition from content experts to a knowledge co-constructor, modelling digital literacy to meet the needs of today's diverse student groups (21st Century Learning Reference Group, 2014; Barber et al., 2015). In the current education environment the roles between the educator and student are constantly being redefined and are interchangeable (Barber et al., 2015). However, for students being prepared for the digital learning expectations at tertiary level, Rossi (2015) argues, 20th century educator do not always possess the required skill set to effectively prepare students for the digital requirements of a 21st century knowledge-based society. The development of this skill set can be impacted by the structures and priorities within the education system that do not enable educators to integrate digital technologies into teaching and learning. These are factors that are extrinsic to educators and hinder the implementation of digital learning opportunities for students (Xie et al., 2021).

2.5 Educator Digital Preparedness

While, in the education sector, there are widely held assumptions of the digital ability of 21st century students, research shows that there is reluctance from educators to include digital technology as a learning strategy tool into curricula (Barber et al., 2013). There is concern from UG lecturers regarding the distraction factor, and the perception that the use of digital technology distracts students from their learning. In a 2017 ECAR study of Faulty and Information Technology it was reported that 52% of all faculty members surveyed, across 10 countries in 124 tertiary institutions, discouraged or banned the use of mobile technology in the classroom (Brooks & Pomerantz, 2017). Many students today are both digitally connected, and optimistic of the benefits of digital technologies for both their educational and post-education pathways. There is an indication of a preference for a blended /online learning environment. However, “the perennial challenge for students in having meaningful plugged-in educational experiences lies in whether and how these technologies are incorporated into their institutions’ cultures, structures and pedagogical methods” (McCormack, 2017, p. 3).

These meaningful experiences, and the successful integration of digital technology into student learning experiences, are influenced by the educators’ preparedness to facilitate digitally focused education. In Brooks and Pomerantz’s (2017) study, overall educator digital skills were described as adequate with limited use of digital technology to support student development of higher order thinking skills. There has been concern expressed in the NZ media that NZ students will not have the opportunity to fully develop their ability to confidently participate in a digitally focused environment due to the lack of preparedness of NZ teachers to teach the digital content in the NZ Curriculum (Corner, 2019; Long, 2019). When the NZ Curriculum revision was introduced, the MoE acknowledged it would be a major shift for some teachers, as the use of digital technology in the classroom may not fit with their frame of reference. Nevertheless, the MoE Early Learning and Student Achievement deputy secretary believes "that over time teachers will become more and more confident" (Long, 2019, para. 10).

Educators are cognisant of the benefits of digital technology integration to student outcomes and the development of student digital agency. However, not all teachers feel prepared to support student development with, and participation in the DLE (Mercader & Gairín, 2020; Sadaf & Johnson, 2017). With the increased access to, and inclusion of, digital technology in education educators need access to professional development and support to successfully implement digital technology into their teaching practice. Like students, they need the opportunity to increase their digital confidence and literacy (Abbott, 2016). In a Norwegian study 20% of teachers surveyed identified that they needed support with digital technology integrations into their classrooms and in 42% of lessons there was no evidence of the inclusion of digital technology (Blikstad-Balas & Klette, 2020). There are similarities with this research and the NZ context where, in a 2016 study, 17% of teachers surveyed identified NZ teachers needed support to develop their ability to include digital technology in their teaching practice (Bolstad, 2017). Mercader and Gairín (2020) proposed the most predominant barrier to digital technology integration in education is professional development that is inclusive of "training, pedagogical approaches, experience and teaching approaches using digital technology" (p. 11). Irrespective of the nature of barriers, the integration of digital technology into the student learning experience is pivotal. Students need access to educators who are able to design and implement digital learning opportunities to improve both their digital confidence and their preparedness for UG studies. Newton (2018) observed that the "NZ education system needs teachers … who have the knowledge, competencies and confidence to capitalise on the undoubted potential of digital technologies” (p. 9) to be able to provide guidance and support to students as they progress through the NZ education system.

There have also been concerns expressed regarding tertiary educators’ level of digital ability to be able to facilitate the DLE. Selwyn (2016) describes this as lecturers being viewed as incompetent by their students and “not knowing how to use the technology” (p. 1012). In their study on the experiences of academics transitioning to the DLE Porter et al. (2020) found that there was an overall feeling of unpreparedness for this transition. However, for tertiary educators being able to implement teaching in a DLE is a requirement and whether or not they are prepared for the transition to this environment is not always considered by their education institution (Cutri et al., 2020). The unpreparedness of tertiary lecturers for the DLE has been acknowledged by Mardiana (2020) along with an unwillingness to teach in the DLE. This unwillingness has been related to their levels of digital literacy and confidence. In the context of UG programmes Porter et al. (2020) suggest that UG lecturers need “to be genuinely prepared, educated, guided and supported” to make the transition to the DLE and that greater support was needed from their education institution. A view that is supported by Fosu (2019).

The preparedness of tertiary educators does have an impact on the success of the DLE as a mode of teaching delivery (Adi et al., 2020). Internationally, in the DLE student retention rates and degree completions are lower when compared to face-to-face delivery. These outcomes have been attributed to the level of skill and experience of university academics in the digital teaching space (Chase & Taylor-Guy, 2020).

2.6 Chapter Summary

It is the priority of the Government that the NZ education system develops “young New Zealanders … to be equipped with the values, knowledge and skills to be successful in the 21st Century” (MoE, 2014b, p. 4). From this literature review it is apparent there are concerns with regard to the digital skills, knowledge and strategies of young New Zealanders as they progress from secondary school students into UG study, and then into the workforce as tertiary graduates. It would appear each sector places the responsibility for developing these capabilities to improve student outcomes on their predecessor (Rossi, 2015; Woulfe, 2014). However, a United Kingdom 2014 report from the House of Lords recognises that digital literacy is an essential skill all individuals must possess to be able to successfully contribute to a digital society. They further propose digital literacy should be considered as important numeracy and literacy and taught as a foundation subject in the school system (House of Lords, 2014). This view is supported by a NZ Business Leaders Group, who are encouraging NZ secondary schools to embed digital literacy into the NZ Curriculum to improve post school outcomes (Laurencez, 2015). As explained in the previous chapter the NZ education system comprises of three levels and is designed for each level to provide the foundational knowledge that students require to successfully progress to the next level (MoE, 2019). The improvement of post school outcomes has the potential to positively impact on student success at tertiary level as the mastering of foundation level subjects increases the possibility students will be able to successfully participate in study at a higher level (MoE, 2015b). This thesis will contribute to the wider discussion on the preparedness of NZ secondary school students for the DLE as they progress into their post-school pathways.

Chapter 3 Research Design

Introduction

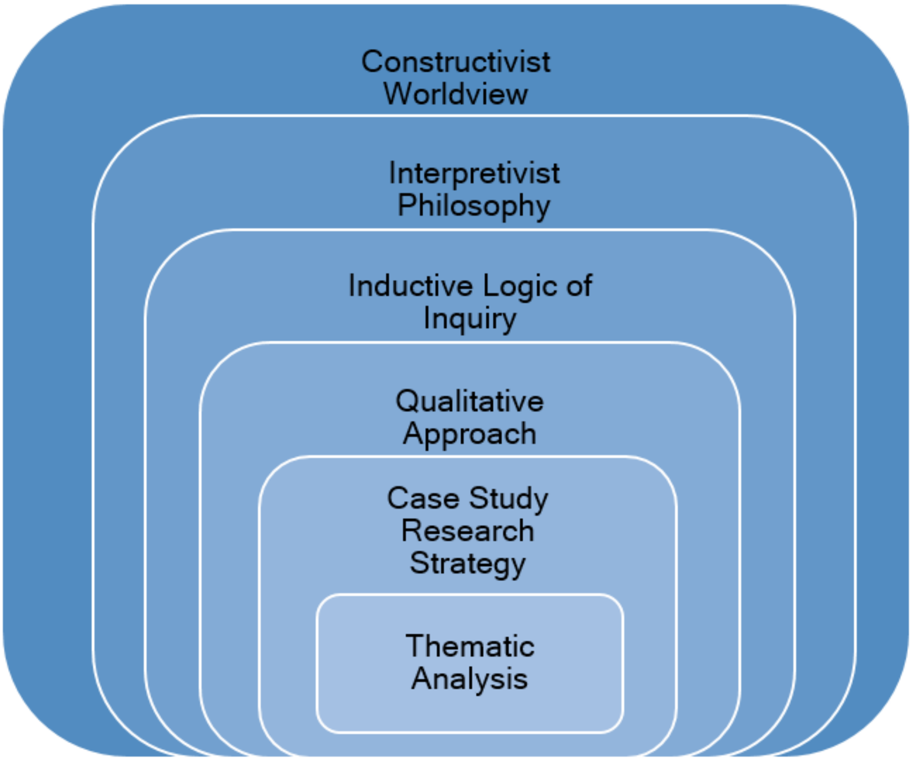
This chapter discusses the theoretical underpinnings of a qualitative research approach and how it was applied to this study. It begins with a detailed description of the framework for research design (Section 3.1) and reintroduces reader to the research question (Section 3.2). The theoretical sampling and sample construction are described and an explanation of the data collection tools are presented in Sections 3.3 and 3.4 respectively. Thematic analysis, the mode of data analysis implemented in this study, is described in Section 3.5. Section 3.6 outlines the trustworthiness and authenticity criteria. The ethical considerations are discussed in Section 3.7. The chapter concludes with a summary in Section 3.8.

3.1 The Framework for Research Design

According to Blaikie and Priest (2019) research design involves the four core tasks of focusing, framing, selecting and distilling “with components that progressively reflect the design’s choices and specifications” (p. 52). These core tasks involve the focusing on the research question to be answered, the framing of the framework for research design, selecting both the theoretical sampling approach and the data collection tools and distilling through the implementation of data collection methods and the analysing of the data to answer the research questions (Blaikie & Priest, 2019; Flick, 2020). In consideration of these research design tasks proposed by Blaikie and Priest (2019), the framework for research design for this study conceptualises how the research design is framed from the epistemology to the theoretical and analytical qualitative approach. The framework is illustrated in Figure 3.1.

Figure 3.1.

Framework for Research Design



Note. Adapted from Blaikie, N. W. H., & Priest, J. (2019). *Designing social research: The logic of anticipation* (3rd ed.). Polity Press.

This study is positioned in a constructivist worldview, underpinned with an interpretivist philosophy using an inductive logic of inquiry. This study employs a qualitative methodology, a case study research strategy and a thematic analytical approach. The following sections provide a description of each phase of the study's framework for research design. Sections 3.1.1 and 3.1.2 provide an overview of the constructivist world view and interpretivist philosophy, while Sections 3.1.3 and 3.1.4 outline the research approach and research strategy, respectively. Section 3.1.5 provide an overview of the theoretical and analytical approach.

3.1.1 Constructivist world view

This research is concerned with how NZ secondary school students construct their knowledge, skills and strategies to develop their digital confidence and preparedness for the first year UG DLE. Piaget determined the process of knowledge construction was both non-linear and an active process (Poonam, 2017). According to Blaikie and Priest (2019) a constructivism research philosophical paradigm is concerned with the understanding of the subjective meanings of participants' reality and the exploration of their interpretations and understanding of the phenomena being studied. Constructivist researchers seek to understand the research context from the participants' perspective and this worldview enables a focus on the specific contexts: personal, social and cultural, where people reside to develop deeper understanding of their reality (Kivunga & Kuyini, 2017). As a worldview constructivism acknowledges the multiple participant understandings that are present and the research is focused on the complexity of those meanings rather than the narrowing of the participants contributions into a limited series of categories or ideas (Blaikie & Priest, 2019). The constructivist researcher is focused on interpreting the participant's contributions and inductively developing explanations for these interpretations (Creswell, 2013).

For a qualitative researcher, a constructivist worldview encourages the researcher to "construct knowledge socially as a result of [their] personal experiences" of the context being investigated (Kivunga & Kuyini, 2017, p. 33). As this research is context specific it is informed by a constructivist world view and a qualitative approach, while a thematic analysis has been identified as the research approach to enable the exploration of the shared interpretations of the participants in this study. In this study a qualitative approach enabled the researcher to acknowledge the multiple interpretations of the research participants' reality by facilitating the understanding, experiences, meanings and perspectives of research participants to emerge from the data (Creswell, 2013). This approach enabled the researcher to explore the participants' understanding of their digital confidence and the level of preparedness of Yr13 biology students for the digital learning expectations of the NZ tertiary sector. It also enabled a multiple lens on the preparedness from the UG lecturers and the participants themselves, an understanding that is subjectively positioned within their worldview.

3.1.2 Interpretivist philosophy

An interpretivist philosophy is focused on the understanding and interpreting of the multiple realities of the participants of the phenomena being studied (Silverman, 2019). This approach requires the researcher to appreciate, and acknowledge, the differences between the participants and requires the use of multiple methods to ensure the different aspects of the phenomena are reflected in the results (Silverman, 2019). The knowledge generated from interpretivism is concerned with the subjective experiences of the participants, and an inductive logic of inquiry has been employed for this study. This logic of inquiry allowed the researcher to determine and define the characteristics to be included in the study and collect data before moving into the study's analysis phase. The determining of the characteristics to be studied resulted in the data collection being limited to specific contexts and the connections between the study concepts being established at a specific point in time (Blaikie & Priest, 2019).

In this study the aim was to explore the preparedness of Yr13 Biology students for the digital learning expectations of the NZ tertiary sector. Using the inductive logic of inquiry the researcher collected data and analysed the results to establish broad patterns to determine the participants understanding of their preparedness of Yr13 biology students for the digital learning expectations of the NZ tertiary sector. The data collection method and analysis process are discussed in greater detail in Sections 3.4 and 3.5 below.

3.1.3 Research approach

The interpretive philosophy is subjective and contextual and investigates the multiple realities of research participants using a qualitative research methodology (Shah & Al-Bargi, 2013). Qualitative research is focused on a phenomena and studies the context and/or setting of the research participants. It is context bound and directed by the research question.

3.1.4 Research strategy

The research strategy is a case study design. Case study research is contextually based and provides a focus on either a singular unit or a collection of units, to be analysed in detail (Merriam, 1998; Stake, 2000). The unit of investigation can be “a programme, an event, and an activity, a process of one or more individuals” (Creswell et al., 2003, p. 15). This study employed the instrumental case study design. An instrumental case study facilitates understanding into the unit(s) being studied (Mills et al., 2010), focuses the unit of investigation on the research question, the issue being investigated, and emphasises the depth and richness of the participants’ narrative. This study uses the case study design to gain an understanding into the phenomena and enabled the researcher to use multiple sources of data to develop an understanding of the meaning of digital preparedness for UG studies for the participants in this study.

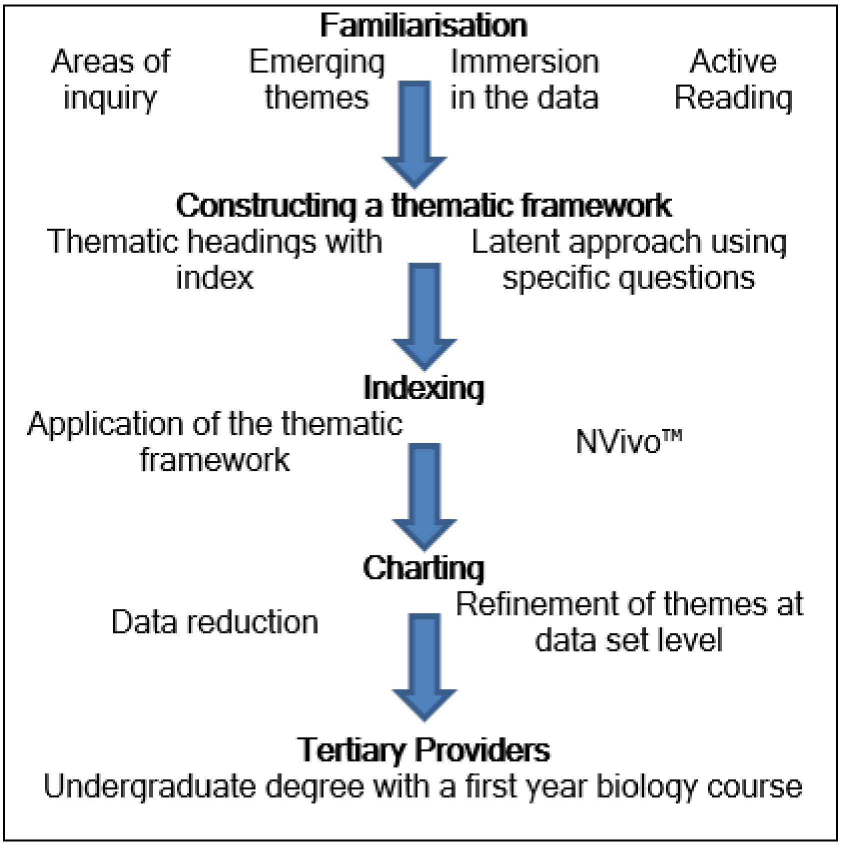
According to (Yin, 2013) case-studies allow an exploration and investigation of both an individuals and communities’ response to a contemporary phenomenon. This research investigated three participant groups from NZ (Yr13 biology students, first year UG students, and UG lecturers) across two NZ education sectors. A case study design allowed the researcher to explore the participants’ perceptions and where they were positioned in relation to their individual education context.

3.1.5 Theoretical and analytical approach

A thematic analysis approach was employed as the primary data analytic process as it supports an inductive logic of inquiry (Clarke & Braun, 2017). This approach involved an iterative, inductive analysis of the qualitative data collected from all participant groups and was guided by Ritchie et al.’s (2003) framework approach (The Framework). The Framework is a matrix-based model and is used to “classify and organise data according to key themes, concepts and emergent categories” (p. 262). Figure 3.2 provides an overview of how the Framework was applied to this study.

Figure 3.2.

Summary of the Study Thematic Analysis Process



Note. Adapted from Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied research policy. In A. Bryman & R. G. Burgess (Eds.), *Analysing qualitative data* (pp. 173-194). Routledge.

This approach allowed the data management and data analysis to be conducted following a systematic and sequential, verifiable and a continuing process. The data collected was organised into three data sets to reflect the characteristics of each participant group (Braun & Clarke, 2006): Yr13 biology students, first year UG students and UG lecturers. The data sets were systematically compared to allow the themes and categories to emerge from the data. This was to ensure the richness and the context from which the participants' experiences are grounded were preserved by the researcher and the research process (Nowell et al., 2017).

Frequency data was collected for this study to provide further explanation and complement the themes and categories that emerged during the thematic analysis. The frequency data included a transaction log of the Yr13 biology students' electronic interactions in the online learning resource (OLR). This log was analysed using a web log analysis approach to establish patterns of digital participation (Jansen et al., 2009).

3.2 Research Question and Research Aims

Secondary school students today are expected to be able to effectively navigate digital platforms for the purpose of learning—an expectation that is crucial for successful educational outcomes (UNESCO, 2011). The preparedness of students for the UG DLE and the successful progression of students from secondary school into UG studies is a priority. At the inception of this study, NCEA L3 biology had the highest number of Yr13 school subject enrolments across NZ and was the most recommended pre-requisite for UG study across 25 tertiary providers in NZ (Education Counts, 2018). It is the expected level of student preparedness for the DLE and the perquisite requirements for UG studies that has led to the question that underpins this research: **How prepared are Yr13 biology students for digital learning expectations of the New Zealand tertiary sector?**

The absence of the exploration of the digital learning experiences of biology students' progression from secondary school to their first year of tertiary study in the literature both locally and internationally is of greater concern. There is a paucity of literature presenting a NZ context on this topic and in view of this paucity the aims of this study are:

1. To examine the level of exposure to, perceived level of confidence with and factors that influence Yr13 biology students' engagement with digital technology
2. To explore the level of preparedness of first year UG students for the digital learning expectations in tertiary education in the health sciences discipline area.
3. To explore the perspectives of health science UG lecturers' expectations of the level of preparedness for digital learning required of their students

The research sub-questions that will support the exploration of the aims and addressing of the research question are:

1. What are the perceptions of Yr13 Biology students of their exposure to and confidence with using digital technology in their schooling?
2. What were the perceptions of Yr13 Biology students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?
3. What was first year UG students’ experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?
4. What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?
5. What do health science UG lecturers require to support students for the DLE in UG study?

The connections between the research questions and the participant groups, data collection methods and data analysis are organised in Table 3.1 in the order they are addressed in the analysis sections of this thesis. As different methods of data collection across three participant groups were utilised to address the research questions, the methods implemented to demonstrate of how quality was maintained throughout this study are also identified.

Table 3.1

Research Questions, Participant Groups, Data Methods and Analysis

Participant Group	Data Collection Method	Quality Measures	Data Analysis
Research question 1: What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?			
Yr13 biology students	Yr13 Biology Student Questionnaire Yr13 Biology Student Post Questionnaire	Testing of rival explanations, negative case analysis, reconciliation with OLR data, peer debriefing, comparison of data sources for research question 1 across participant groups, Prolonged engagement	Thematic coding of questionnaires, comparison of questionnaire responses pre- and post- OLR participation
Yr13 biology students	Online Learning Resource	Prolonged engagement, peer debriefing	Transactional log analysis to establish patterns, and timing, of digital participation
Research question 2: What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?			
Yr13 Biology Students	Yr13 Biology Student Questionnaire	Testing of rival explanations, negative case analysis, reconciliation with OLR data, peer debriefing, comparison of data sources for research question 2 across participant groups	Thematic coding of questionnaires, comparison of questionnaire responses
Research question 3: What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?			
First year UG students in the health science discipline area	First Year Tertiary Study Questionnaire	Testing of rival explanations, negative case analysis, peer debriefing, comparison of data sources for research question 3 across participant groups	Thematic coding of questionnaire

Participant Group	Data Collection Method	Quality Measures	Data Analysis
Research question 4: What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?			
Health science UG lecturers	Asynchronous Focus Group	Member checking, peer debriefing, comparison of data sources for research question 4 across participant groups, prolonged engagement	Thematic coding of contributions
Research question 5: What do health science UG lecturers require to support students for the DLE in UG study?			
Health science UG lecturers	Asynchronous Focus Group	Member checking, peer debriefing, comparison of data sources for research question 5 across participant groups, prolonged engagement	Thematic coding of contributions

3.3 Theoretical Sampling

The case study strategy allowed the researcher to determine the breadth and depth of the study through the application of sample inclusion criteria (Creswell, 2008; Yin, 2013). Baxter and Jack (2008) refer to this as "ensur[ing] your study remains reasonable in scope" (p. 546-547). In qualitative research sampling is theoretically grounded and theoretically defined. Theoretical sampling enables the researcher to construct a sample whose understanding, experiences, meanings and perspectives are relevant to the research questions and the interpretation of the phenomena being studied (Silverman, 2017).

3.3.1 Sample construction

A feature of theoretical sampling is the selection of the case to be studied. The selection of the case to be studied began with a review of the MoE secondary school subject enrolment data and in 2014 across 7 Yr13 subjects Yr13 Science had the highest number of enrolments (Education Counts, 2018). To narrow the focus of the case study, in 2015 a review of UG entry criteria across health science portfolios was undertaken of the 25 tertiary providers in NZ to determine the science pre-requisites that were recommended for UG study (Table 3.2).

Table 3.2

Science Pre-requisites for UG Programmes in New Zealand in 2015

Science Subject	UG Programmes Reviewed	Required Pre-requisite	Strongly Recommended Pre-requisite	Recommended Pre-requisite
Biology	58	22	17	19
Chemistry	22	19	3	1
Physics	19	16	3	0

From this review biology was identified the prevalent science subject pre-requisite for entry to the UG programmes in the identified programme portfolios. To meet the prerequisite requirements Yr13 students needed to complete NCEA L3 Biology internally and externally assessed assessments and enrolment in, or completion of, NCEA L3 Biology is the first inclusion criteria of this study.

The NZ Curriculum is achievement standards based and the successful completion of internally and externally assessed assessments demonstrates the students met the criteria to be awarded the standard. In 2015 NCEA L3 Biology had three externally assessed achievement standards, and secondary school students were most successful in Achievement Standard 91603 (AS91603), with a national pass rate of 80% (New Zealand Qualifications Authority| Mana Tohu Mātauranga o Aotearoa (NZQA), 2016). The number of enrolments in the AS91603 external exam combined with the success rate were a key consideration in the selecting AS91603 as the focus for this study. Therefore, the second inclusion criteria was students who were enrolled in AS91603 and who attended face-to-face classes for this topic. The rationale for this will be discussed in the data collection section (Section 3.4) below.

As this study was facilitated across the NZ education sector in secondary schools and tertiary education the final inclusion criteria for this study was the educators[1] employed at the sites utilised to access student participants. The connection between the inclusion criteria and participant selection are listed in Table 3.3 and a description of the participant groups is discussed next in Section 3.3.2.

Table 3.3

Participant Inclusion Criteria

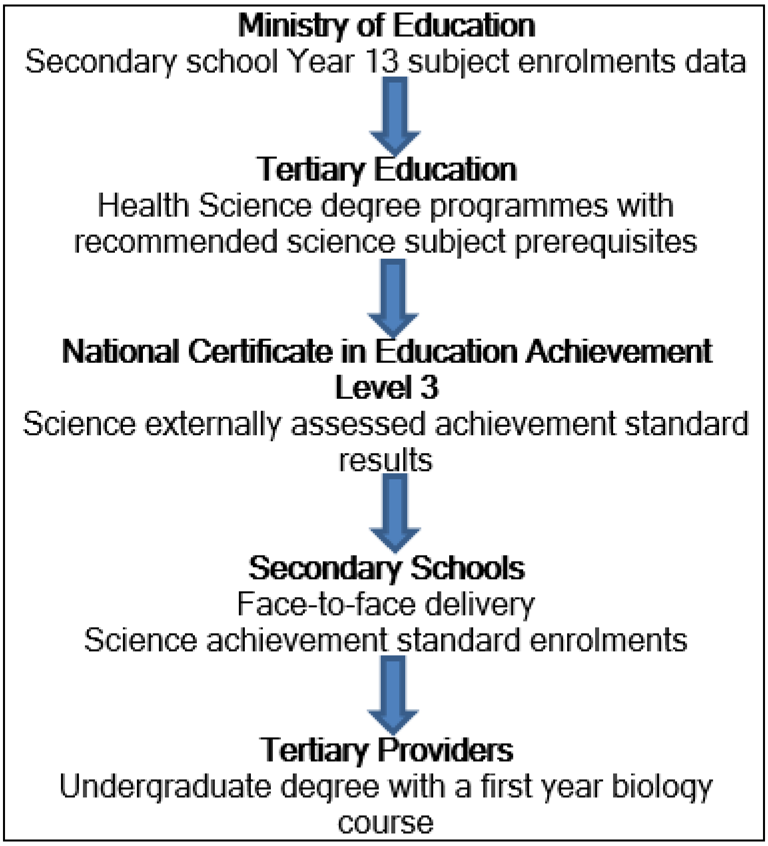
	Inclusion Criteria	Participant Groups
1	Enrolled in a face-to-face class for AS91603	Yr13 biology students
2	Completion of NCEA L3 Biology	First year UG students in the health science disciplines
3	Employed at sites utilised to access student participants	UG health science lecturers

[1] Initially secondary school teachers had been invited to participate in this study but they withdrew their expression of interest.

Figure 3.3 provides an overview of the process that was implemented to construct the sample and determine the three sample inclusion criteria for participant selection in this case study.

Figure 3.3.

Selection of the Case Study Inclusion Criteria



3.3.2 Description of participants

The participants in the study were Yr13 biology students, first year UG students enrolled in health science disciplines and UG health science lecturers who teach first year UG students as indicated below. All participants who consented and met the inclusion criteria were included in this study. There was no differentiation made on the basis of age, gender or ethnicity, as this differentiation is not consistent with theoretical sampling (Silverman, 2017).

3.3.2.1 Yr13 student participants

There were 92 Yr13 students enrolled in AS91603 across five L3 Biology classes from two regional secondary schools who met inclusion criteria one. The participants were accessed from secondary schools and tertiary providers from within a geographically convenient region in NZ. Five regional secondary schools were approached who had students enrolled in, a NCEA Level 3 biology course. Two of these schools agreed to participate in this study.

3.3.2.2 First year UG student participants

There were 88 first year UG student participants who met inclusion criteria two. Four regional tertiary providers, who offered UG programmes in the health science discipline where NCEA Level 3 biology was either a prerequisite or strongly recommended as an entry criteria were contacted and three agreed to participate in this study. The participants were enrolled across seven degree programmes that had a biology course in their first year of their degree. Sixty three (72%) of the UG students who participated in this study had completed a NCEA Level 3 biology course within the three years of the time of data collection. At the commencement of this study NCEA Level 3 biology had the highest number of Yr13 subject enrolments and was the most requested entry criteria subject for UG enrolment. Forty one (47%) of the students surveyed transitioned immediately from secondary school into UG study (Table 3.4).

Table 3.4

UG Student Year of Yr13 Biology Course Completion

Year of study	2017	2016	2015	2014	2013	2012	2011	2010	Pre 2010
No. of responses	41	11	11	6	4	2	2	3	8

3.3.2.3 UG lecturer participants

Participants in this group consisted of seven UG lecturers employed in the health science discipline area who all taught first year UG students. Their teaching experience ranged from new teachers in their first year of practice up to 15 years of teaching practice.

3.4 Data Collection Methods

This study employed three data collection methods: questionnaires, an asynchronous focus group (AFG) and online activity logs from an online learning resource (OLR), to gather data relating to the research questions from the three participant groups. Table 3.5 provides a summary of the data collection method utilised for each participant group and the relevance to the research objectives for each method are described below.

Table 3.5

Participant Groups, Data Collection Methods, and Research Questions

Participant Group	Data Collection Method	Question	Timing
Yr13 biology students	A Yr13 Biology Student Survey questionnaire (Yr13Q) to capture information concerning the students exposure to, and perceived level of confidence utilising digital technology	1,2,	During the classroom scheduled teaching of the topic
	Online activity logs from the OLR containing a number of online activities to assess the student's ability to successfully navigate a digital platform and the quality of work produced, for the specific purpose of learning.	1	
	A Yr13 Biology Student Post Survey questionnaire (Yr13PQ) on completion of the online learning package to determine what factors influenced their digital learning experience	1	
First year UG students in health science disciplines	A First Year Tertiary Study Survey questionnaire (TSSQ) questionnaire to examine the students' experience of utilising digital technology for the specific purpose of learning within their course of study.	3	Semester 2 (2nd half of the academic year)
Health science UG lecturers	An asynchronous focus group (AFG) was utilised to explore the digital technology, independent learning skills and abilities participants expect students to have mastered.	4,5	Semester 2 (2nd half of the academic year)

The following sections provide a description of the development of the data collection methods. Section 3.4.1 provides the rationale for the questionnaire development. The data collection of the Yr13 biology students is described in Section 3.4.2. This section addresses the development of the questionnaires for this participant group and the development of the OLR to enable the production of the online learning logs. Section 3.4.3 provides the First Year Tertiary Study Survey questionnaire development followed by Section 3.4.4 which describes the UG lecturer AFG.

3.4.1 Questionnaire development

Questionnaire design involves a range of decisions which includes the consideration to design a new questionnaire or adapt published validated questionnaires (Tsang et al., 2017). Sousa et al. (2017) cautions that when adapting questionnaires validity may be compromised as "researchers cannot ensure that the members of the sample population will comprehend the adapted items appropriately" (p. 1289). One of the considerations in questionnaire adaptation is whether the context of the research participants will be captured in the use of published validated questionnaires (Moon, 2017). At the commencement of this study, the researcher undertook a literature review to explore the published questionnaires that were currently available that would address the focus of the research; secondary student preparedness for using digital technology in the NZ education context. To date and to the researcher's knowledge there was no available research questionnaires specifically tailored to capture the perceptions of NZ secondary school students about their confidence and preparedness for the digital learning expectations of the NZ tertiary sector. According to Tsang et al. (2017) there are two preliminary considerations that researchers need to be aware of when using an existing questionnaire. First there needs to be the identification of the construct to be measured and how the construct will be operationalised. The constructs of preparedness, confidence and digital learning have been defined in Section 1.2.1 of Chapter 1 and the construct of preparedness was one of the main barriers that prevented the use of a pre-existing questionnaire as the emphasis was student readiness which, as discussed in the literature review chapter, is not the focus for this research. Another issue was the research sample which comprised NZ Yr13 biology students. The researcher was unable to confirm the existence of a validated questionnaire that had been developed for and administered to a sample group with similar respondent characteristics to the NZ Yr13 biology students in this study. According to Juniper (2009) validated questionnaires should only be used when the research sample group has the same respondent characteristics at the time the questionnaire was validated. Surveys and questionnaires reviewed (e.g. Banneheke et al., 2017; Ewell & Rodgers 2014; Florence, 2017; Holles, 2016; Monnapula-Mapesela, 2015; Parkes et al., 2015) revealed that the definitions, research sample, research intention were different to this study. Hence, the decision was made to design a new questionnaire for the purpose of this study.

The purpose of qualitative research is to encourage the richness of the participants stories to emerge from the data and is bound within their individual context (Creswell, 2013). This enabled the researcher to gather richer, context specific data about the students' experience that is positioned in the NZ Curriculum. The questionnaires were specifically designed for this study to ensure they not only capture the constructs of preparedness, confidence and digital learning but that they also reflected the NZ context; including the Digital Citizenship Model (Netsafe, 2015a) discussed in Section 1.2.2 of Chapter 1.

As this study uses a qualitative methodology the purpose of the questionnaires was to capture the participants own realities and perspectives and provided the opportunity for participants to describe their responses and/or to select from pre-determined categories. Three questionnaires were utilised for this study were all named as surveys for participants but were, however, questionnaires according to the research:

1. Yr13 Biology Student Survey
2. Yr13 Biology Student Post Survey
3. First Year Tertiary Study Survey

The questionnaires included a combination of the frequency data and qualitative focused questions; forced-choice, Likert Scale, and open-ended questions. The questionnaires that gathered data from student participants were reviewed by a secondary school teacher and a tertiary lecturer to ensure the questions were at the appropriate level of knowledge and comprehension for the students, and that the students would be familiar with the language used in the questionnaires.

At the time of the questionnaire development the questionnaires were circulated to participants with the working title “Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand”. This working title evolved with the research process.

3.4.2 Yr13 biology students data collection

The three data collection tools utilised for the Yr13 biology student participants were:

1. The Yr13 Biology Student Survey questionnaire to capture information concerning the students’ exposure to, and perceived level of confidence utilising digital technology (Section 3.4.2.1)
2. Activity logs from an online learning resource (OLR) containing a number of online activities to assess the student’s ability to successfully navigate a digital platform and the quality of work produced, for the specific purpose of learning. These logs capture the frequency of use, time spent on the OLR and the completion of the online activities (Section 3.4.2.2).
3. The Yr13 Biology Student Post Survey questionnaire on completion of the online learning package to determine what factors influenced their digital learning experience (Section 3.4.2.3)

At the request of the secondary schools participating in this study, paper-based questionnaires for data collection tools 1 and 3 were circulated to Yr13 biology student participants.

3.4.2.1 Yr13 Biology Student Survey questionnaire

The Yr13 Biology Student Survey (Yr13Q) is a questionnaire that was designed for this study (Appendix A) to address research questions 1 and 2 for the secondary school student participant group. The purpose of the Yr13Q was to capture student perceptions of their preparedness for digital learning before participation in the OLR. As previously explained as this research is guided by the Netsafe (2015a) Digital Citizenship Framework it was decided to design a new questionnaires concentrating on core aspects of the Netsafe (2015a) Digital Citizenship framework to capture the students' perceptions.

The Yr13Q consisted of four distinct sections: (1) frequency data, (2) the students' secondary school context, (3) their experience using digital tools for learning and (4) their post school pathway. Table 3.6 provides an overview of the Yr13Q questionnaire, and the connection to the Digital Citizenship framework (Netsafe) core aspects of participation, attitude from a confidence perspective, skills and strategies, and knowledge. The participation focused questions are designed to capture the students' perspectives regarding equity of access, as explained in Section 2.4.1 of the Literature Review chapter. It is proposed access to the DLE produces greater opportunities for participation. Access is an important aspect of the skills and strategies focused questions. In their paper *From literacy to fluency to citizenship* Netsafe (2018) identify students require "skills and strategies to access technology to communicate, connect, collaborate and create" (p.4). It is through knowledge development that students are able to understand and integrate the digital environment into their individual contexts. As mentioned earlier in this section a combination of question types, such as qualitative focused questions, forced-choice, Likert Scale, and open-ended questions, were utilised in this questionnaire and are indicated as follows in Table 3.6: QF=qualitative focused; FC=forced-choice; LS=Likert Scale and OE=open-ended.

Table 3.6

Yr13 Biology Student Survey Questionnaire Section Overview

Focus Area	Questions

Participation	• Please identify the types of digital technology that you use and the amount of time you would spend, on average, each week using digital technology. (OE)
	• Does your school have a “bring your own device” policy where you bring your own device to school for the purpose of learning? (FC).
	    • What type of device did you take to school? (OE).
	    • Please explain if this policy has had a positive impact on your studies this year. (QF)

Confidence:	• How would you describe your confidence with digital technology? (LS) • How would you describe your confidence with using digital technology for your school work? (LS)/(QF) • How would you describe your confidence with using the following digital tools technology for your school work? (LS)
Skills and strategies:	• In the last week how many classes at school did you use a digital device for your school work? (FC) • Are you planning to study at University next year? (FC) • How do you expect to learn at University? (QF) • From the list below please select the digital tools you have used at school in the last week to complete your school work. (FC) • As part of your Biology paper are you required to access resources and/or complete activities in an online learning system, e.g. Moodle, Blackboard, Strata (FC)
Knowledge	• What do you like about using the internet and digital devices for learning? (QF) • How do you expect to use digital technology in the future? (QF) • What don’t you like about using the internet and digital devices for learning? (QF) • Please list any digital technology skills you would like to learn to help you with your school work (OE)

The Yr13Q was given to Yr13 biology students after they had been taught the course material related to Achievement Standard 91603 (refer to Section 3.3.1) and prior to their participation in the OLR. The Yr13Q was administered at the start of their class as opposed to the end of the class. This strategy was implemented with consideration to Dillman’s work on group administration of self-administered surveys, where student participants did not always take reasonable time to complete questionnaires at the completion of their class

(Dillman, 2007). Ninety-two Yr13Q were circulated and eighty-seven were returned. Dillman's guidelines for group administration of a questionnaire was implemented (Table 3.7). Any questions from the group administration participants were discouraged prior to questionnaire completion to ensure no group was provided with additional information that may have informed their responses.

Table 3.7

Guidelines for Group Administration

Questionnaire Elements	**Element indicators**
Introduction	Acknowledge the interruption to their class A brief description of the questionnaire and explain the research as outlined in the information sheet Overview of the process Read the information sheet Complete the questionnaire Immediately put the questionnaire back in the envelope to ensure your responses remain confidential. No-one in this room will see your questionnaire
Special Instructions	If you have any questions, please raise your hand and I will answer any queries you have. As soon as you have put your questionnaire in the envelope, I will collect your envelope. If you do not wish to participate in this research, please leave the questionnaire in the envelope and I will collect it during today's session.
Distribution	Every potential participant will receive an envelope with containing the questionnaire and a separate information sheet.
Retrieval	Questionnaires will be collected once they have been placed in the envelope from where each participant is sitting
Debriefing	Thank the group for their time and answer any further questions regarding the study.

Note. Adapted from Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method.* John Wiley & Sons.

Students who chose not to participate in the study were followed up by their teacher and provided with an activity to do while data collection was in progress.

3.4.2.2 Online Activity Logs from the Online Learning Resource (OLR)

As discussed in the literature review pre-university exposure to learning management systems may have an impact on student preparedness for university digital environments (Parkes et al., 2015). The online learning resource (OLR) was developed to provide the Yr13 biology students with a digital learning experience so they could reflect on how prepared they perceived they were for the digital expectations of tertiary study. The open sourced learning platform that was utilised to host the OLR was MoodleCloud©. The features of MoodleCloud© enabled the collection of participant usage frequency data and access across iOS, Android and Windows.

The researcher was employed as tertiary lecturer in a degree programme at the commencement of this study, and developed the OLR using their knowledge of digital learning activities available to students in a degree level programme. In consultation with the secondary schools involved in this study an OLR session plan (Appendix B) was developed that captured the session outcomes, student activities and digital resources required for each data collection point. This plan and digital resources were reviewed by a secondary school teacher, who teaches Yr13 biology classes, to ensure the student activities and the layout of the OLR were at the appropriate learner level. The utilisation of teacher experience and knowledge of students ensured the OLR supported the course content. It was important the content included in the OLR was not new knowledge for the students as its purpose was to provide the students with a platform to be able to reflect on their level of digital confidence, their perceptions of and attitudes towards their skills and abilities in the OLR, not knowledge acquisition. To ensure there was no interruption to the students' class learning experiences the focus of the OLR was to support the school's Yr13 biology curriculum, including the teaching of the Achievement Standard 91603 (Appendix C) and to provide a NCEA L3 examination revision resource for the student research participants.

The OLR was developed using a format that allowed it to be set up into topics, which supports the teaching and learning strategy of scaffolding (moodle, 2019). In a study on secondary school student preparedness for the UG DLE, Parkes et al. (2015) identified that secondary student participants felt “poorly prepared” for learning that occurred via a learning management system. It has been suggested that this was related to student unfamiliarity with the way digital learning occurred in the tertiary sector. As a result scaffolding was a critical concept for the implementation of this project as the researcher had no prior knowledge of the learning preferences of the students, or their level of digital skills and strategies, knowledge and confidence to be able to participate in the OLR. This format enabled the researcher to develop a resource with a staged approach to provide support and guidance during session one of the project and move the responsibility for learning to the student by the third session (Appendix D).

3.4.2.3 Online activity logs

As previously discussed, the OLR was developed to provide the Yr13 biology students with an opportunity to reflect on their level of confidence and their experience participating in a digitally focused learning experience. Online activity logs were maintained during the Yr13 biology students’ OLR participation. At the conclusion of OLR phase of this study, the participant online activity logs were exported from MoodleCloud©. An issue identified in the students’ self-assessment of their preparedness for UG studies was their “knowledge of the Learning Management System” (Parkes et al., 2015, p. 8). These logs represented the frequency data strand of this study and their purpose in this study was to identify how, when and where the Yr13 biology students participated in the OLR. The logs provided the analytics of the OLR page, resource views and participant engagement with the resources and/or activities to supplement the qualitative focused descriptions and explanations of the research questions 1 and 2, which was to explore the level of preparedness of Yr13 biology students for first year UG studies in a DLE.

3.4.2.4 Yr13 Biology Student Post Survey Questionnaire

The Yr13 Biology Student Post Survey (Yr13PQ) questionnaire was also designed for this study (Appendix E) to address research question 2 for the secondary school student participant group. In their study on student preparedness Parkes et al. (2015) identified reflection and the balancing of commitments as a required competencies in the management of the DLE. The purpose of the Yr13PQ was to capture student reflections of the digital activities post participation in the OLR and to determine what factors influenced their participation in the OLR. The Yr13PQ did not collect frequency data from the students, but asked the students to provide their identification number to enable the data collected to be compared to their OLR participation and the Yr13Q during the data analysis phase of the research.

The questions in the Yr13PQ were focused on the OLR activities they participated in and their perceived level of confidence with, and preparedness for digitally focused learning. This questionnaire was designed to focus on core aspects of the Netsafe (2015a) Digital Citizenship framework to capture the students’ perceptions (Table 3.6). As explained in Section 3.4.2.1 of this chapter a combination of question types were utilised in this questionnaire, indicated as follows in Table 3.8: QF=qualitative focused; FC=forced-choice; LS=Likert Scale; and OE=open-ended.

Table 3.8

Yr13 Biology Student Post Survey Questionnaire Overview

Focus Area	Questions
Participation	• If you were not able to complete all the pages what factors may have affected your ability to do this (FC) • What do you plan to do when you leave school (FC) • Is school preparing you to use digital technology for work and/or study in the immediate future? (FC)/(QF)
Confidence	• How would you describe your confidence with using the following digital tools? (LS) • Thinking back to the first survey you completed, has there been a change in your confidence with using digital technology for your school work? (LS)/(QF) • How would you describe your confidence with digital technology for your future work and/or study plans? (LS)/(QF)
Skills and Strategies	• On the Moodle page which of the following sections did you complete (FC) • In your opinion, is school preparing you to use digital technology for work and/or study in the immediate future? (FC) • Please explain your answer (QF) • Please list any digital technology skills you think you need to learn to help you with your intended ‘after-school’ plan (OE)
Knowledge	• What did you like about this resource package? (QF) • What didn’t you like about the resource package? (QF)

The data collection of this questionnaire was timed to occur within one week of completion of the independent homework session in the OLR to ensure they were able to recollect their participation in the OLR. As the same participant group was being accessed, the group administration process, including the guidelines identified in the preceding section, were implemented. Table 3.9 provides the overview of the data collection timeline for the Yr13 students.

Table 3.9

Yr13 Data Collection Timeline

Week	Data Collection Activity	Details
Week 1	Questionnaire	Yr13Q
Week 2	OLR	Session 1: In class
Week 3	OLR	Session 2: Scheduled Homework
Week 4	OLR	Session 3: Independent Homework
Week 5	Questionnaire	Yr13PQ

3.4.3 First year UG students data collection

The data collection for first year UG students is also guided by the Netsafe (2015a) Digital Citizenship framework. The First Year Tertiary Study Survey (TSSQ) (Appendix F) was designed to also focus on core aspects of the Netsafe (2015a) Digital Citizenship framework to capture the students' perceptions (Table 3.10) and to address the research question 3 for the first year of tertiary study student participant group. That is, to explore the level of digital preparedness of first year UG students and examine the level of exposure to, perceived level of confidence with and factors that influence students' engagement with digital technology. The purpose of the TSSQ was capture student reflections on their level preparedness for digitally focused learning at tertiary level. The questions corresponded to the focus of the Yr13PQ questionnaire to support a comparison of the experiences of the participant groups during data analysis.

The TSSQ consisted of four distinct sections: (1) frequency data, (2) the students' secondary school context, (3) their tertiary digital learning experience and (4) if tertiary study met their expectations. Table 3.10 provides and overview of the TSSQ questionnaire, and the connection to Digital Citizenship framework (Netsafe, 2015a) core aspects of participation, attitude with a focus on confidence, skills and strategies and knowledge. As explained in Section 3.4.2.1 and Section 3.4.2.4 of this chapter a combination of question types were utilised in this questionnaire, indicated as follows in Table 3.10: QF=-qualitative focused; FC=forced-choice; LS=Likert Scale; and OE=open-ended.

Table 3.10

First Year Tertiary Study Survey Questionnaire Overview

Focus Area	Questions

Participation	• Please identify the types of digital technology that you use and the amount of time you would spend, on average, each week using digital technology. (FC)
	• Did your school have a "bring your own device" policy where you bring your own device to school for the purpose of learning? (FC)
	    • What type of device did you take to school? (OE)
	    • Please explain if this policy has had a positive impact on your studies this year. (QF)

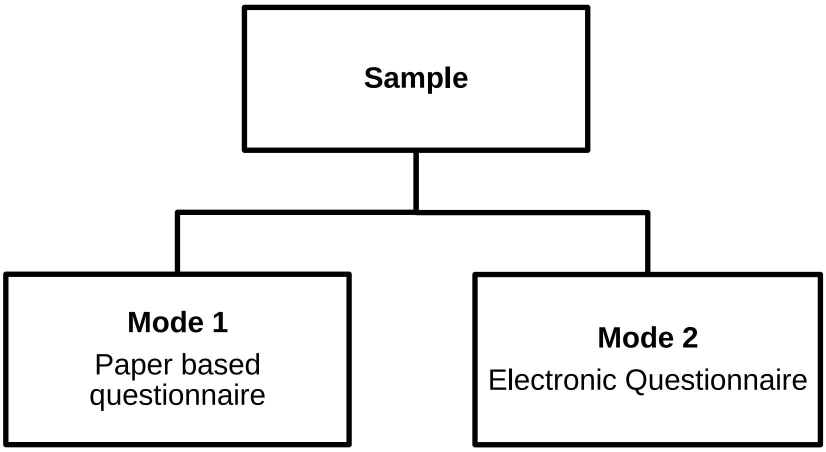
Confidence	• How would you describe your confidence with technology prior to entering tertiary studies? (LS)
	• How easy do you find your degree programme's online environment to navigate? (LS)
	    • Please explain your response (regarding navigating the online environment), providing examples if appropriate. (QF)
	• How easy do you find your degree programme's online environment to navigate? (LS)
	    • Please explain your response (regarding navigating the online environment), providing examples if appropriate. (QF)
	• In your degree programme online environment:
	    • What do you like about online learning? (QF)
	    • What don't you like about online learning? (QF)

Skills and Strategies	• How would you describe your confidence with using the internet for learning prior to entering tertiary studies? (LS) • Please explain your response (level of confidence), providing examples if appropriate (QF) • Thinking back to your secondary schooling, what technology skills did you use that have been useful to your studies this year? (QF) • What technology skills have you needed to learn this year to be able to successfully engage with your programmes online learning components? (OE)
Knowledge	• What did you think learning in University would be like? (QF) • Did you expect a lot of learning using digital technology? (FC) • Was there as much digital technology as you expected? (FC)

The research questionnaire was developed using a mixed-mode survey design. This design is described as using combinations of modes to collect data (Bethlehem & Biffignandi, 2012) and in this study the questionnaire was offered in both paper based and electronic modes. Bethlehem and Biffignandi (2012) have identified there are methodological considerations with mixed-mode questionnaires and a concurrent mixed-mode data collection was implemented (Figure 3.4).

Figure 3.4.

Concurrent Mixed-Mode Data Collection



Note. Adapted from Bethlehem, J., & Biffignandi, S. (2012). *Handbook of web surveys*. John Wiley & Sons, Inc. https://doi.org/10.1002/9781118121757

The rationale for using a mixed-mode survey design was to enable an effective way to improve questionnaire coverage and enable the collection of data from tertiary institutions with multiple campus sites (Taherdoost, 2016). The concurrent mixed-mode data collection allowed the researcher to organise the participants to administer the survey mode based on the tertiary location (Bethlehem & Biffignandi, 2012). To reduce mode effects the questionnaires were developed using Dillman (2007) unimode approach. Consideration is given to minimising mode effects related to question interpretation by insuring the visual layout and design was consistent for both questionnaire modes.

The electronic questionnaire was circulated to two tertiary institutions using a link to the online survey platform, Qualtrics©, and access to the questionnaire was provided to potential participants through the tertiary institutions learning management system. As the questionnaire was developed specifically for this study, Question 4 of the questionnaire was a route instruction that guided participants who did not meet the study criteria to the end of the questionnaire (Bethlehem & Biffignandi, 2012). However, a limitation for this method of data collection was that the researcher did not have access to recruit potential participants and was unable to implement a nonresponse strategy to follow up directly with the participant group. According to Koundinya et al. (2016) this method of questionnaire distribution also meant there was no way to keep an accurate measure of the sample size. The electronic survey link was active for six months and during this time 36 tertiary students completed the survey.

The paper based questionnaire was circulated across a further five degree programmes in the second semester of their first year of UG studies in the health science discipline area and was a reflection on their first semester studies. The data collection occurred using timetabled sessions and 3 uncompleted questionnaires were returned to the researcher. As a result of the 180 of questionnaires completed, 70 have met the inclusion criteria for this study.

As the data for the paper-based questionnaire was collected from five degree programmes it was also important promote a degree of context consistency for the mixed-mode questionnaire design. As discussed earlier in this chapter Dillman's (2007) guidelines for group administration of a questionnaire were implemented to ensure that the paper-based questionnaire participants were not provided with additional information that may have informed their responses.

3.4.4 UG lecturer data collection

As the UG lecturers who participated in this study were geographically dispersed across two tertiary campuses, the data collection occurred through an AFG. The AFG was facilitated through a discussion forum on an external learning management system, MoodleCloud©. The AFG was semi-structured and comprised of seven key questions to focus the discussion towards research questions 4 and 5. Namely, to explore the level of preparedness of first year UG students for a DLE, and to explore the perspectives of UG lecturers' expectations of the level of digital preparedness required of their respective students (Appendix G). The seven questions and the connection to the Digital Citizenship framework (Netsafe, 2015a) core aspects of participation, attitude from the perspective of confidence, skills and strategies and knowledge and digital literacy skills are presented in Table 3.11.

Table 3.11

UG Lecturer Asynchronous Focus Group Key Questions

Focus Area	Questions
Participation	• What are some of the digital skills, knowledge, and strategies you think students need to be able to effectively and efficiently use digital technology for learning purposes?
Confidence	• How confident are you using digital technology in your teaching? • From your experiences with supporting school leavers to transition into a degree programme, how prepared to do you think school leavers are for the self-regulated e-learning expectations at tertiary level
Skills and Strategies	• Should digital literacy be taught as a foundation subject alongside numeracy and literacy? Why/Why not? • What guidance would you give to Yr13 students, to prepare them for the digital learning requirements at tertiary level?
Knowledge	• What do you understand to be “digital literacy”? • If we were to formalise digital literacy in the tertiary setting, what are some of the digital competencies you think students need to be able to effectively and efficiently use digital technology for learning purposes?

A key advantage of an AFG is participants have time a greater amount of time to reflect on the questions and the opportunity to provide considered and detailed responses (Williams et al., 2012). Participants are also able to contribute at a time convenient to their individual schedules (Zwaanswijk & van Dulmen, 2014).

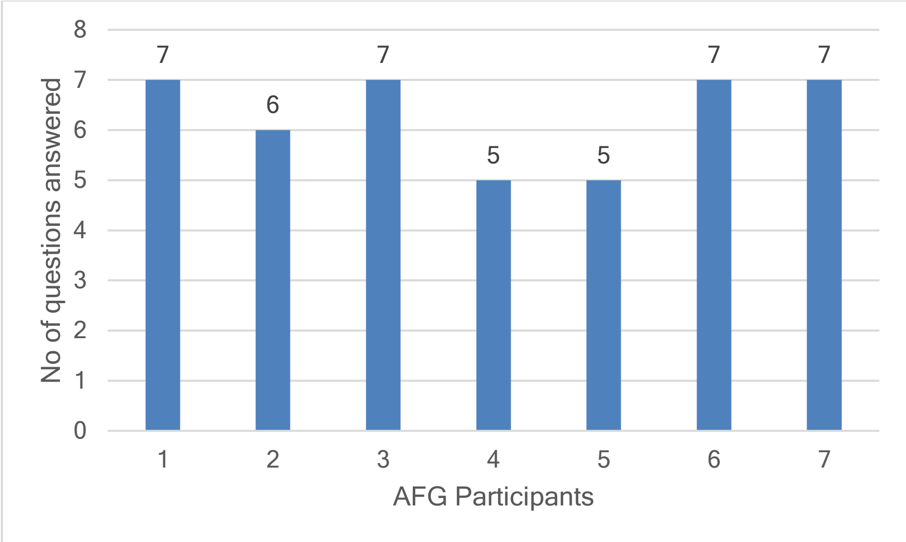
Unlike a face-to-face focus group AFGs allow researchers to engage in reflexive iteration by taking time to consider participants responses during data collection. This position allowed the researcher to revisit the data and engage with the participants to encourage deeper and richer discussion to develop and is consistent with the iterative theoretical and analytical approach of this study (Srivastava & Hopwood, 2009; Williams et al., 2012).

In the role of AFG moderator, the researcher ensured an interactive discussion board was maintained by promoting a conducive environment for participants (Moore et al., 2015). The first discussion forum on the AFG contained the discussion guidelines, the processes the AFG members, including the researcher, consciously and intentionally agreed to enable the group to work effectively together to meet the previously identified research outcomes. As well as posting the AFG questions, the researcher used prompts, provided further information on the concepts being explored, and sought further clarification from participants as appropriate (Williams et al., 2012). To encourage ongoing participant engagement for the duration of the AFG private messages were sent from MoodleCloud© when a new question was posted to the discussion form and to follow up with a participant who had not contributed. The recruitment of participants occurred via a two-stage process. The first stage involved seeking expressions of interest in participating in the AFG from tertiary lecturers and secondary school teachers who met the study inclusion criteria. Eight health science UG lecturers agreed to participate. The second stage required those who had expressed interest to complete the consent to participate form.

When the consent to participate form had been returned by the eight UG lecturers, the participants were provided with logon instructions (Appendix H) which included step-by-step instructions of how to access the OLR and seven logged onto the AFG. Once the logon was completed participants were also sent a private message from MoodleCloud© reminding them to review and respond to other contributions and that the principles of the AFG are the same as a traditional focus group with the only difference being the use of text-speak to communication attitudes, feelings, beliefs and experiences. The AFG data collection occurred over a 3 week period with a question posted on a Monday, Wednesday, and Friday. Participants were advised the anticipated time required would be no more than 90 minutes for the duration of the AFG. There were 67 posts in the AFG and 57% of the UG lecturers stayed with the AFG for its duration (Figure 3.5).

Figure 3.5.

UG Lecturer Participation in AFG (N=7)



3.5 Data Analysis Method

This case study gathered qualitative and frequency data from three sources of evidence; questionnaires, online focus group, and online activity logs to explore the participants' responses to the research topic. A thematic analysis approach was employed for the analysis of the qualitative data to enable the researcher to explore, and appreciate the relationships between the data sets (Silverman, 2017). This approach involved an iterative, inductive and thematic analysis of the qualitative data collected from all participant groups and was guided by Ritchie et al.'s (2003) five stage matrix based framework to facilitate the emergence of participant meanings from the data. The five stages are (1) familiarisation, (2) constructing a thematic framework, (3) indexing, (4) charting, and (5) mapping and interpretation. These are discussed in Sections 3.5.1 to 3.5.5 below.

The three paper-based questionnaires were scanned and uploaded into NVivo for analysis. The questionnaire data collected in the online survey platform, Qualtrics©, was downloaded into Excel spreadsheet format, then converted to a Word document for uploading into NVivo for thematic analysis. The qualitative data from the online asynchronous focus group was downloaded from the external learning management system, MoodleCloud©, and uploaded into NVivo for thematic analysis. The frequency data from the questionnaires and the online activity logs were entered into an Excel spreadsheet for analysis. The frequency data entry was cross-checked. Due to the amount of qualitative data collected, 277 questionnaires and 67 AFG posts, a computer assisted qualitative analysis software (NVivo) was used to assist with the data organisation and analysis (Bazeley & Jackson, 2013; Parkinson et al., 2016).

3.5.1 Familiarisation

The first stage of data analysis involved researcher familiarisation with the qualitative data sets. Through data immersion the researcher systematically read all of the data collected for the Yr13Q to develop an understanding of the complete data set. To begin the process of data analysis the data set for the Yr13Q was then randomly divided into multiples of 10 to create manageable blocks of data. This strategy of data organisation is supported by Kiernan and Hill (2018) in their guide to framework analysis. A sample from the Yr13Q data set was read and re-read and the researcher began to identify data of both interest and significance to the research question (Appendix I). Further samples of 10 were drawn from the Yr13Q data set and memoing continued until no further themes or relationships emerged from the data (Kiernan & Hill, 2018). The generating of areas of enquiry and emerging themes then commenced (Figure 3.6).

Figure 3.6.

Process of Analysis: Yr13 Student Data Set Areas of Enquiry and Emerging Themes

Areas of Inquiry
Confidence with digital learning
Access to digital technology
Experience with digital learning
Digital literacy development
Student preferences

Emerging Themes
1. Student confidence with digital learning
2. Access to digital learning opportunities
3. Digital challenges affecting digital learning participation
4. Educator preferences affecting digital learning participation

This process was repeated for the Yr13PQ, and the TSSQ. The UG lecturer AFG data set was also read in its entirety several times and the researcher began to identify data of both interest and significance to the research question. As with the questionnaire data sets, the generating of areas of enquiry and emerging themes then commenced.

3.5.2 Constructing a thematic framework

The study's research question, objectives and conceptual framework framed the next stage of data analysis, the identification of the thematic framework, to ensure the researcher remained cognisant of the focus of the study and the study remained within scope. The purpose of this stage is to organise the data and this stage is informed by points of interest and significance and the initial codes from the familiarisation stage (Ritchie et al., 2003). The initial areas of enquiry and emerging themes were reviewed to enable the researcher to develop an understanding of the patterns that were emerging from the data. The section headings from the questionnaires were used to begin the process of organising the areas of enquiry and emerging themes. As the thematic framework developed, to ensure the researcher had clarity regarding the application of the emerging themes, an index was established. This index informed the application of the thematic framework to the remaining data sets in the subsequent stages of the data analysis (Kiernan & Hill, 2018; Parkinson et al., 2016).

The researcher worked through a number of iterations of the framework development until no further index categories emerged from the data. These codes were organised into categories and the initial thematic framework was developed which consisted of five thematic headings (Figure 3.7).

Figure 3.7.

Process of Analysis: Initial Thematic Framework With Index for Yr13 Data Set

Thematic Headings with Index

Confidence

- 1.1 21st century students
- 1.2 Digital learning
- 1.3 Motivation to learn
- 1.4 Learning preferences
- 1.5 Digital literacy

Access

- 2.1 BYOD
- 2.2 Digital resources availability
- 2.3 Accessibility to digital learning
- 2.4 Digital infrastructure reliability
- 2.5 Digital delivery
- 2.6 Convenience

Challenges

- 3.1 Availability of digital entertainment
- 3.2 Priorities
- 3.3 Distractions
- 3.4 Impact of digital devices on learning
- 3.5 Attitude toward digital learning

Teacher

- 4.1 Teacher preferences
- 4.2 Teacher guidance
- 4.3 Assessment

Preparation

- 5.1 After school plan
- 5.2 Independent learning
- 5.3 Digital literacy
- 5.4 Digital exposure

The thematic framework with index were uploaded into NVivo© and the computer assisted indexing and labelling of the remaining data commenced.

3.5.3 Indexing

During this phase of data analysis, the index categories continued to be developed (Kiernan & Hill, 2018). Data that did not align with the above thematic headings was initially assigned to an “other” category. “Other” data was critically reviewed and the significance of the data to the research question and objectives was considered. If the data was viewed as important to the study further themes were developed (Parkinson et al., 2016). During this stage of data analysis previously considered data was revisited to determine if these emerging themes were present (Kiernan & Hill, 2018) and revisions to the thematic framework were made. Figure 3.8 provides an example from the Yr13 student data of the application of indexes to the data extract.

Figure 3.8.

Process of Analysis: Example of Yr13 Student Data Set Data Extract With Index Applied

Data extract	Index applied
That the internet is not reliable, you can’t circle, highlight, annotate, etc., on questions and all of my work is not in the same space. Expensive to replace, fix or purchase devices	Digital learning Learning preferences Digital access Traditional vs digital

3.5.4 Charting

The fourth stage of matrix based framework involves charting. Ritchie et al. (2013) describe this stage as the organisation of the study’s thematic framework to enable the researcher to make sense of the data that occurred when all the participant data has been coded. This stage was focused on the systematic organisation of the coded data into Ritchie and Spencer (1994) framework grid in NVivo. As part of the data reduction process at this stage data within each theme heading is summarised to reduce the data set (Bonello & Meehan, 2019). Figure 3.9 is an example of how this data reduction occurred for the Yr13 participant data. However, in instances where the participant contribution was succinct and further researcher summarisation was not required the text in NVivo was formatted to reflect the summary was authentic participant voice (Parkinson et al., 2016).

Figure 3.9.

Process of Analysis: Example of Charting for Yr13 Data Set

Transition preparation
- 1.2 Digital learning
- 4.3 Assessments
- 5.1 After school plan
- 5.2 Independent learning
- 5.4 Digital exposure

Digital learning challenges
- 1.3 Motivation to learn
- 2.3 Accessibility
- 3.1 Availability of digital entertainment
- 3.2 Priorities
- 3.3 Distractions
- 3.4 Impact of digital devices on learning
- 3.5 Attitude toward digital learning
- 4.1 Teacher preferences

3.5.5 Mapping and interpretation

The final stage involved the mapping of the data and in this stage the researcher began the process of data interpretation. The key objectives of qualitative analysis as described by Ritchie and Spencer (1994) were followed and the NVivo charts were examined to develop an understanding of and the connections within the codes, the data and the research notations. Ritchie and Spencer (1994) describe this being more than the recording of the repetition of patterns but making sense of the data by “searching for a structure, rather than a multiplicity of evidence” (p. 186). Figure 3.10 provides an example of how the mapping process occurred in this study and development of the initial thematic framework with index (see Figure 3.6).

Figure 3.10.

Process of Analysis: Mapping of Theme One for the Yr13 Student Data Set

Student preparation for tertiary studies

Transition pathways

- 4.3 Assessments as primary digital activity in school
- 5.1 Student progression to UG studies
- 5.2 School preparation for independent learning
- 5.4 Digital exposure at secondary school

Digital learning challenges

- 1.3 Motivation to learn
- 3.6 Availability of digital entertainment
- 3.7 Extracurricular priorities
- 3.8 Distractions
- 3.9 Impact of digital devices on learning

Note. The numbers in this figure represent the initial thematic framework index presented in Figure 3.7

The frequency data in this study included a transaction log of the Yr13 biology students' electronic interactions in the OLR. As the focus of this study is the preparedness for digital learning 12 highly ranked competencies from Parkes et al. (2015) preparedness ratings were utilised to develop and describe the preparedness behaviours the researcher expected participants would demonstrate when interacting with the OLR (Table 3.12).

Table 3.12

Expected Participant Interactions with the OLR

OLR Section	Preparedness by showing their capacity in this space	Behaviour
Create New Account	Identifies the necessary requirements to complete a task	Logged on using the instructions provided to log on to the site
OLR Duration	Applies the rules of netiquette consistently	Interactions with the OLR follow the Netiquette Guide for Online courses document (Centre for Teaching Excellence, n.d.)
Tropisms	Demonstrates use of learning management system	Accessed the Module
	Uses technology to assist in the construction of knowledge	Completed the online test and reflected on result in forum
Tropisms Growth Responses	Downloads and uploads information and resources	Using online software concept map created, saved as PDF and uploaded
Taxic Tropics Crossword	Use of web browser with skill and purpose	Online activity completed
Scheduled Online Homework Session	Works to a disciplined timeframe	Accessed Module at the time identified in the OLR schedule
	Uses search engines effectively	Contributed to the resource database
	Responds to others with respect	Review resource database entry and posted feedback in database
Independent Homework Session	Considers and acts upon feedback	Reviewed feedback on resource database entry
	Forms connection between prior knowledge and new knowledge	Review of Tropism forum post
	Works to a disciplined timeframe	Test completed within the identified timeframe
Support Tools	Seeks information through either own enquires or the questioning of others	Engaged with the researcher and peers using the available communication tools – message, forum post, blue button

All the participant interaction data from the external learning management system, the OLR activity logs for all Yr13 biology students, were extracted from the server. As explained in Section 3.4.2.3 the purpose of these logs was to identify how, when and where the Yr13 biology students engaged with the OLR. There were a total of 2232 interactions across the eight sections of the OLR (please refer to Table 3.8) during the 12 days the resource was available to the Yr13 biology student participants... Each section of the OLR contained a variety of activities that the students were asked to engage with (Appendix B). These logs were analysed using a transactional log analysis approach to complete a participant behaviour analysis and establish patterns, and the timing, of their digital participation (Jansen et al., 2009). The sequence of interaction for each participant was mapped and analysed to provide further explanation to the participants' descriptions of their meanings and understandings of preparedness for digital learning. Table 3.13 provides an example of the transactional log analysis for Yr13 student Yr13.52.

Table 3.13

Transaction Log Analysis for Yr13 Participant Yr13.52

OLR Session	OLR activity log	Days and time of access		OLR activity codes
Classroom session	23 42	1	Class session Early evening	Self-enrolment Forum posting Forum review View video Quiz Access online software Create online concept map Assignment upload
Scheduled Homework Session	23 8 30	2	During school After school Early evening	Blue button Google search Resource database Resource review
Independent Homework Session	7 29 2	3	During school After school Before school	Resource Review Reflective forum posting Open book test

3.6 Trustworthiness and Authenticity

This qualitative research study has by its very nature utilised multiple modes of data collection to capture the diverse realities of the research participants that are a feature of a constructivist paradigm. Trustworthiness is a qualitative concept that refers to the “quality, authenticity and truthfulness of findings of qualitative research (Cypress, 2017, p. 254). According to Nowell et al. (2017) “to be accepted as trustworthy, qualitative researchers must demonstrate data analysis has been conducted in a precise, consistent, and exhaustive manner” (p. 1). For this study the researcher employed Braun and Clarke (2006) 15-point checklist to ensure an accurate thematic analysis of the data has occurred. The researcher had a well organised system to store the study raw data which Nowell et al. (2017) also identified as a means of establishing trustworthiness.

Authenticity is unique to constructivist inquiry and requires researchers to “engage in several processes to ensure that the findings are credible not only from the participants’ experiences but also with regard to the larger implications of research” (Shannon & Hambacher, 2014, p. 2). The researcher has employed Lincoln and Guba’s (1986) widely accepted trustworthiness and authenticity criteria to demonstrate how rigor was achieved in this study. The strategies employed in this study to meet this criteria are described below in Sections 3.6.1 to Section 3.6.3.

3.6.1 Credibility

Credibility in qualitative research is concerned with providing an assurance the research findings have been critically investigated and represent a genuine account of the participants’ contributions. The credibility strategies of prolonged engagement, cross-checking of data and member checking have been employed in this study and are discussed in Section 3.6.1.1 to Section 3.6.1.3, respectively.

3.6.1.1 Prolonged engagement

Prolonged engagement occurred with the Yr13 biology student participant group. The researcher was present at each of the six data collection points and facilitated the face-to-face and two online sessions with the OLR. This allowed the researcher to become familiar with the setting and learning context for the Yr13 biology student participant group.

3.6.1.2 Cross-checking

As this study is positioned within a constructivist worldview, the strategy of cross-checking was employed to enable the researcher to gather multiple views of the phenomena. As a validity strategy the comparing and cross-checking of the datasets (Hastings, 2010) that were collected on multiple sites from three participant groups using three data collection methods, as described in Section 3.4 above, and the intersecting ideas in relation to common ideas/themes in the data has occurred. Data was also gathered from three individual layers (Korstjens & Moser, 2018) in the NZ education system: (1) secondary school (Yr13) students; (2) tertiary (first year UG) students and (3) tertiary (UG) lecturers.

The researcher discussed the research methodology, data analysis and interpretations with a peer who was not directly involved in the research project. This provided the researcher with the opportunity to discuss biases, methods, issues and concerns and enabled the researcher to have access to an independent guidance and “point out the implications” of the researcher’s actions (Williams, 2011, p. 5).

3.6.1.3 Member Checking

Member checking has occurred through respondent validation for the UG lecturer participant group. The AFG contributions were clarified by the researcher during data collection as the AFG progressed. During the interpretation stage of data analysis the UG lecturers were offered the opportunity to provide feedback on this document.

3.6.2 Transferability

Transferability involves the trustworthiness strategy of thick description (Korstjens & Moser, 2018). This was achieved by using the purposive sampling method described in Section 3.3.1 of this chapter, and providing a thick, detailed and accurate description of the both the participants’ contributions and their context. This description will be discussed in detail in the data analysis chapter of this thesis.

3.6.3 Dependability and confirmability

According to Hadi and Jose Closs (2016) readers of research "make their own judgements about the quality, transferability and worth of a study" (p. 646). In this chapter, to ensure transparency of the research process, the researcher has provided a detailed description of the research process and ensured the process of analysis is consistent with the research design. Fush et al. (2018) acknowledge qualitative researchers need to mitigate the lens they bring to the research to ensure they are interpreting the participant's world view. In this study the researcher's lens has been identified in the rationale of the study (Chapter 1, Section 1.1) and neutrality has been achieved by a robust analysis process to ensure the participants worldview is accurately represented in the researcher's interpretations.

3.7 Ethical Considerations

The ethical issues identified in this research study are the result of consideration of the National Health and Medical Research Council (2007) National Statement on Ethical Conduct in Human Research 2007 and the researcher's commitment to "minimise, justify and manage … risk" (p. 11) to the research participants. The researcher's primary concern is the protection of the participating Yr13 and UG students and UG lecturers with regard to continuing participation and anonymity in the final thesis and any publications that may result for this study (Lewis, 2003).

The following sections provide a description of the ethical considerations of this study. Section 3.7.1 describes the research approval process and Section 3.7.2 outlines the informed consent considerations. Privacy, anonymity and confidentiality are discussed in Section 3.7.3. Section 3.7.4 identifies the NZ Childrens Act 2014 requirements while Section 3.7.5 details the data storage requirements.

3.7.1 Research approval

The research study was completed through Curtin University's Graduate Research School, and approval was sought and gained from the Curtin University's Ethics Committee

(Appendix J). This study was conducted across two levels of the NZ education system and involved both staff and students from each level. Research approval was sought from the Ethics and/or Research Committees from the selected tertiary institutions who participated in this study.

Lewis (2003) identifies "the way in which [institution] access is negotiated….can be critical to the success of the study" (p. 62) and a request was sent to the NZ MoE seeking research approval to undertaken this research at NZ secondary schools. On the advice of the Ministry the researcher formally contacted the Principal of each secondary school within the selected regions and followed the requirements of the schools to undertake the research.

3.7.2 Informed consent

The process of informed consent contains a number of elements and occurs throughout the duration of the research project (Grady, 2015). It is an essential prerequisite for all research participation. From a participant perspective it occurs at every interaction point with the researcher, starting at the recruitment phase and continues beyond the data collection phase with each research output. Informed consent has two elements; information and consent and a balanced disclosure of the study information to prospective participants is required (Krueger & Casey, 2014). Full disclosure of the study was provided to all prospective participants through a mixture of paper-based and electronic mediums to facilitate informed choice to participate in the research. The obtaining of consent was determined by the data collection method and facilitated through both the digital environment and traditional consent processes.

3.7.2.1 New Zealand Informed Consent Considerations

In NZ there is no statutory law regarding the age a young person can contribute in research without parental consent and as this project involved 17-18 year-olds enrolled in a secondary school the schools' parental consent requirements were followed. In the first meeting with secondary school students the researcher provided a verbal explanation of the study and answered any questions. For the Yr13 students there was the potential for them to feel coercion or pressure to participate due to the information letters and letters of consent being disseminated to them by their own classroom teacher. To mitigate this the research information was disseminated by the researcher to provide a level of distance and to allow the student to consider their participation without pressure. The students were given a paper copy of the Information Sheet and Consent Form (Appendix K) and advised the consent form needed to be signed before they could contribute to the study. As there were three data collection points for this group voluntariness of consent was revisited at each data collection opportunity (Hardicre, 2014).

3.7.2.2 Voluntariness

Both the Yr13 secondary school students and UG lecturer participant groups were aware of their right to withdraw from the study at any time.

3.7.2.2.1 Yr13 secondary school student participant group

As explained above voluntariness of consent was revisited at each of the three data collection points for this participant group. This reiteration was important as the researcher was supervised by a teacher at each data collection point and the relationship between teachers and students can impact voluntariness (Tulyakul & Meepring, 2020). At the first data collection point 92 students completed the Yr13Q, and 77 students chose to participate in both the second data collection point, the OLR, and final data collection point, the Yr13PQ.

3.7.2.2.2 UG lecturer participant group

As the researcher was a colleague of the UG lecturer participant group they may have felt obliged to participate in the study. The researcher made it clear that participation in the research was voluntary and that they could withdraw from the AFG at any time. After the expressions of interest in participating in the AFG had been received no tertiary lecturers withdrew from the study.

3.7.3 Privacy, anonymity and confidentiality

Anonymity is an aspect of privacy and is related to the visibility of the participants throughout the research process. According to Marx (1999) there are seven types of identity knowledge that are need to be considered to protect participant anonymity. These are: name, locatability, pseudonyms either linked or not linked to name or location, pattern knowledge, social categorisation and symbols of eligibility/non eligibility. If the identify knowledge cannot be protected anonymity cannot be maintained, the participants become visible and privacy is unable to be preserved. Novak (2014) describes the connection between anonymity and confidentiality as participant anonymity as the tool that enables the researcher to maintain confidentiality. Confidentiality is viewed as the relationship between the research and the participants. This relationship is trust based and the participants have confidence the researcher will only reveal their personal, identifiable information, as specified in the informed consent documents.

In terms of the types of identity knowledge name, locatability and pattern knowledge have been considered to maintain participant privacy and confidentiality throughout this research project. At no time will the participants' contribution to the research be able to be identified in any presentations or publications of the results. For the AFG data pseudonyms have been utilised throughout the research and in the final research report. Marx (1999) identifies that while the use of pseudonyms in research means a participants are anonymous, it does not mean, through the identification of distinct characteristics or patterns of being, the participant is unknown. The student questionnaire data and UG lecturer AFG data was numerically coded to remove any identifying features (Table 3.14).

Table 3.14

Participant Identifiers

Participant Group	**Participant Identifier**
Yr13 student	Yr13S
UG student	UGS
UG lecturer	UGL

There is also a risk of participant locatability and pattern knowledge identification from the personal identifiers of the Yr13 biology students relating to gender assigned at birth and male assigned at birth (MAAB) and female assigned at birth (FAAB) information has not been reported on in this research (Petrova et al., 2016).

For the data that was collected in the digital environment third party questionnaire software via the Curtin University Qualtrics account URL https://curtin.au1.qualtrics.com was used. The questionnaire link was distributed on participating tertiary organisations learning management system forums. To maintain participant anonymity and confidentiality no form of identity knowledge information was collected as part of the questionnaire responses.

3.7.4 Childrens Act 2014

The Childrens Act 2014 (the Act) became law in NZ on 1 July 2014. The purpose of this Act is “to protect and improve the wellbeing of vulnerable children” and provides schools the option to safety check volunteers (MoE, 2017) . As the researcher was chaperoned while on school premises and all data collection points were supervised by a NZ registered teacher the selected secondary schools involved in this research study did not require the researcher to undertake safety checking.

3.7.5 Data storage

Data generated by this research project was securely stored on the researcher’s personal password protected computer while analyses were completed. Paper-based data was scanned and turned into digital formats as soon as possible, but whilst this was occurring was kept in a locked cabinet in a private residence which has no public access. A data management plan was created and followed according to Curtin University requirements. At the completion of the research data will be stored securely on the Curtin R drive for seven years. After this time, all data will be destroyed.

3.8 Chapter Summary

This chapter discussed the theoretical underpinnings of the study’s qualitative research approach. The framework for research design has been conceptualised for the reader and demonstrates how the research design is framed from the epistemology to the theoretical and analytical qualitative approach in Section 3.1. The research questions were restated in Section 3.2. The theoretical sampling and sample construction were described and an explanation of the data collection tools, including the development of the questionnaires, the online activity logs and the AFG, was presented in Section 3.3 and Section 3.4 respectively. The mode of data analysis was described in Section 3.5 and the strategies to demonstrate the findings of this research were authentic and truthful were discussed in Section 3.6. The ethical considerations were outlined in Section 3.7.

Chapter 4 Results

Introduction

This chapter presents the findings of the data analysis. The data for this study was collected in 2017 on multiple sites across three individual layers in the New Zealand (NZ) education system. The process of thematic analysis as outlined Section 3.5 of the previous chapter was followed for all data sets to determine the themes that answered the research questions. The thematic analysis for the Yr13 student data set was completed first, followed by the generating of the initial themes for the first year UG students and the UG lecturer data sets2. The themes for these two data sets were reviewed and refined to identify the intersecting ideas in relation to common ideas/themes in the data sets. Comparison between the Yr13 student, first year UG student and UG lecturer perceptions led to further cross-checking of the students' understanding of the phenomena being studied.

The thematic analysis approach was employed for the analysis of the qualitative data to enabled the researcher to explore, and appreciate the relationships between the data sets (Silverman, 2017). This approach involved an iterative, inductive and thematic analysis of the qualitative data collected from all participant groups and was guided by Ritchie et al.'s (2003) five stage matrix based framework to facilitate the emergence of participant meanings from the data. The five stages are (1) familiarisation, (2) constructing a thematic framework, (3) indexing, (4) charting, and (5) mapping and interpretation: The results from the Yr13 student questionnaire data and online frequency logs are presented in Section 4.2, followed by the results from the first year UG student questionnaire data in Section 4.3. The results from the UG lecturer AFG data are presented in Section 4.4. The chapter concludes with a summary of the research findings in Section 4.5.

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[2] Individual participants will be referred to using the gender-inclusive pronouns of they, them, their and themselves

4.1 Research Findings

The data in this research was collected using three data collection methods (as described in Section 3.4 in Chapter 3) and analysed across the three participant groups. The findings are aligned to the research questions of this study which are re-stated below.

4.1.1 Research questions

The research question that guided this study was: **How prepared are Yr13 biology students for digital learning expectations of the New Zealand tertiary sector?** The research subsidiary questions are as follows:

1. What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?
2. What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?
3. What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?
4. What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?
5. What do health science UG lecturers require to support students for the DLE in UG study?

The results are discussed in the following three sections to provide a deeper understanding of the participants' perspectives of the digitally focused teaching and learning environment. The first section to be discussed is the analysis of the data collected from the Yr13 student participant group (Section 4.2), followed by the results of the UG student questionnaire (Section 4.3). The results of the UG lecturer AFG data are presented in Section 4.4.

4.2 Yr13 Biology Students

This section presents the findings of the research study undertaken to address the first and second research questions which are related to the Yr13 student learning experience at secondary school:

1. What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?
2. What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?

Using the principles of thematic framework analysis, guided by Ritchie et al. (2003) five stage matrix based framework, four main themes emerged from the data in response to the questions, namely, (1) supporting the development of student digital confidence, (2) student preparation for tertiary studies, (3) confidence for digital learning and (4) student learning preferences. The data presented in this section is based on the feedback received from 92 Yr13 biology students who completed the Yr13Q, 77 Yr13 students who participated in the OLR, and 77 Yr13 students who completed the Yr13PQ. The alignment of the research questions, themes, sub-themes and index categories is summarised in Table 4.1 and the findings for this participant group are reported in Section 4.2.1 to Section 4.2.0 respectively.

Table 4.1

Yr13 Student: Relationship Between Research Questions 1 and 2, Themes, Sub-themes and Index Categories

Themes	Sub-themes	Index
Research question 1: What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?		
Supporting the development of student digital confidence through digital responsiveness (4.2.1)	Student digital preferences Teacher support for digital confidence Student access to digital learning opportunities	Digital orientation Digital infrastructure Digital delivery OLR relevance Accessibility
Student preparation for tertiary studies in a digital environment (4.2.2)	Transition pathways Uncertainty Digital learning challenges Student priorities Digital distractions	Impact on learning Learning Management system Independent learning Student progression Assessments Distractions Digital entertainment Priorities
Confidence for digital learning (4.2.3)	Access to digital learning opportunities Access to digital resources	Digital Exposure BYOD Digital Literacy Digital resources Motivation 21^{st} century students

Themes	Sub-themes	Index
Student learning preferences (4.2.4)	Student knowledge and skill development Educator approach	Knowledge Student preferences Self-directed learning Convenience 21st century students Learning styles Teacher preferences Teacher guidance
Research question 2: What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?		
Supporting the development of student digital confidence through digital responsiveness (4.2.1)	Teacher support for digital confidence Student access to digital learning opportunities	Digital infrastructure Digital delivery Accessibility
Confidence for digital learning (4.2.3)	Access to digital learning opportunities Access to digital resources	Digital Exposure BYOD Digital resources

4.2.1 Yr13 Student: Supporting the development of student digital confidence through digital responsiveness

The first theme to be discussed for this participant group is the development of the Yr13 student participant group digital confidence through digital responsiveness. This theme identifies access to digital learning opportunities, including the stability of the available digital infrastructure, is an issue for this participant group. The Yr13 students are seeking both greater digital support from their teachers, and relevant digital participation, to be able to develop their digital confidence. This theme is focused on Yr13 students' perceptions of the strategies implemented by their respective secondary schools to support their digital confidence development.

The Yr13 student experience of digital learning was varied and captured the entire continuum from students feeling prepared for the DLE as they progress from secondary school to having no opportunities to experience digital delivery. There were Yr13 students who perceived their respective secondary schools did not view digital delivery as a priority and there were limited opportunities provided for them. For example, one Yr13 student indicated there were no digital learning opportunities until the final year of their secondary schooling [Yr13S.32], while another stated that their teacher did not allow digital devices in the classroom.

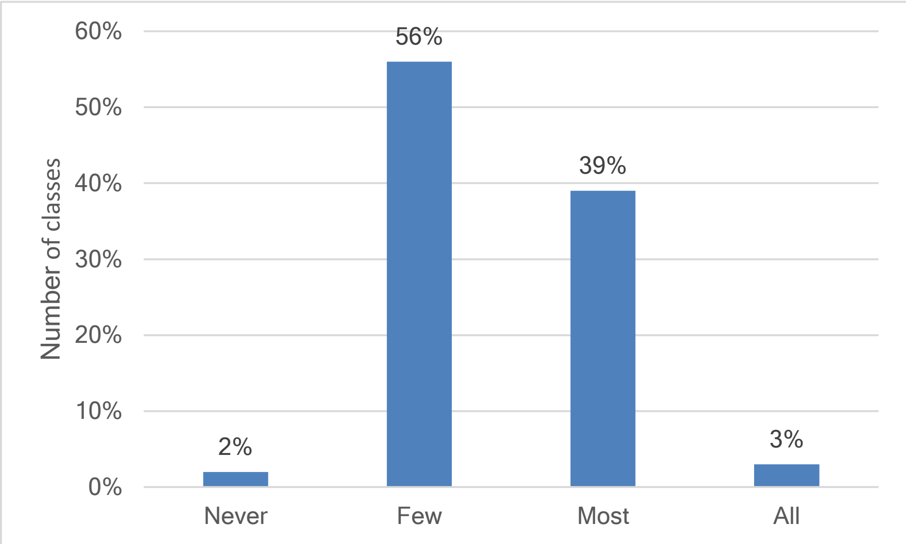
From the Yr13 students' perspective, a significant amount of digital delivery and the use of digital technology at secondary school is related to assessment completions. Yr13 students expressed confidence using digital technology to complete the digital submission of assessments. In terms of the rethinking of digital interaction with Yr13 students, one Yr13 student stated

> *I use a variety of digital technology at home but not at school. School has no impact on my digital abilities [Yr13S.62]*

This perceived lack of impact may be attributed to the amount of digitally focused learning the Yr13 students are participating in. Figure 4.1 below shows how many classes the Yr13 students used a digital device for learning during the week the questionnaire was administered. Most of the Yr13 students experienced digitally focused learning only in a few classes.

Figure 4.1.

Yr13 Student Classes Where a Digital Device was Required (N=67)



Yr13 students also commented on the unreliability and slowness of school internet connections. At times this meant that the school Internet was unavailable or digital resources were unable to open and this access created frustration for Yr13 students as their learning experience was interrupted. For one Yr13 student, one of the factors that they did not like about using digital technology for learning was because

I live in the country my internet is really bad and limited [Yr13S.10]

Yr13 students acknowledged that there were also issues when the software on the personal digital device was incompatible with the school's digital resources provided and that personal digital device issues could not always be resolved by their institution's support staff.

However, despite these issues 86% of students reported being required to access resources and/or complete activities in an online learning system as part of their Yr13 biology paper, Achievement Standard 91603 (AS91603) (refer to Section 3.3.1 in the previous chapter). They were asked to identify from a pre-determined list the digital activities they had participated in during the week prior to the survey for their biology paper. 88% of the Yr13 students surveyed accessed a biology resource and 52% of the Yr13 students submitted an assignment. A summary of their responses is provided in Table 4.2.

Table 4.2

Yr13 Student: Yr13 Biology Class Digital Activity Participation [N=69]

Digital Activity	Number of responses
Accessed a biology resource	88%
Completed a Google search	84%
Checked my grades	61%
Read an article	54%
Submitted an assignment	52%
Watched a PowerPoint/slideshow	45%
Read a forum post	22%
Took a quiz	17%
Worked on a group project online	12%
Messaged my teacher	12%
Accessed a news forum	12%
Posted in a forum	4%
Replied to a forum post	3%
Blogging	1%
Accessed your biology class Facebook page	1%

While eleven Yr13 students were not required to access resources and/or complete activities in an online learning system, this lack of access did not appear to have a significant impact on their confidence utilising digital technology for learning. Nine of these Yr13 students reported a neutral to high level of confidence using digital technology for learning. However, for one of these students the issue regarding accessing digital resources was related to the instability of their school's internet which meant that "*so we don't get much done*" [Yr13S.45]. Another Yr13 student attributed the lack of access to the fact that although "*lots of* [their] *school is on the net*" they simply "*don't prefer to learn that way*" [Yr13S.85].

4.2.1.1 Student digital preferences

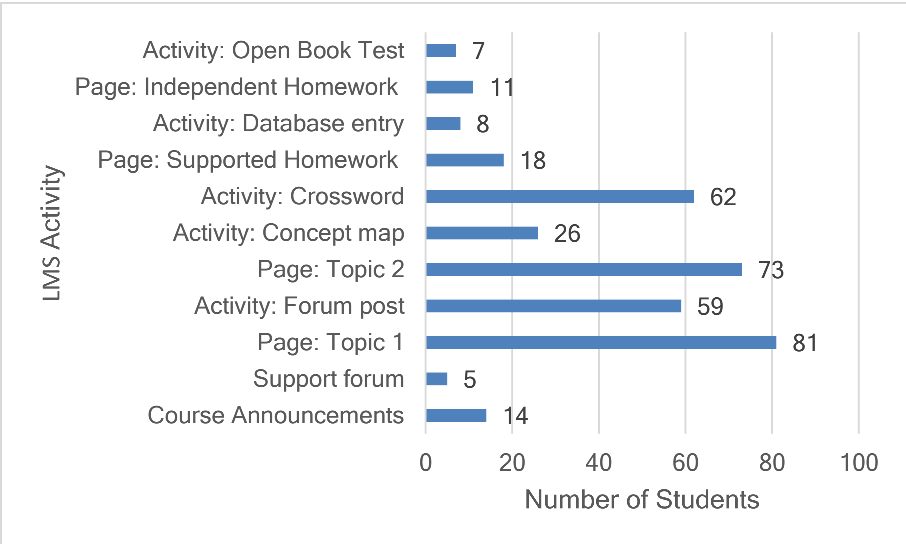
Yr13 students acknowledged that the school curriculum is changing to include greater digital content and there has been a mixed response from Yr13 students regarding this change. Eighty eight percent of Yr13 students reported being confident in the digital environment. They have been immersed in the digital culture and "*already know enough to be able to complete the work*" [Yr13S.67]. While they enjoy both independent learning and using digital technologies for learning, they do not believe school provides them with the opportunity to develop their digital knowledge. They view themselves as having grown up in the digital era and regularly encounter digital technology focused learning opportunities [Yr13S.09; Yr13S.87]. They view digital learning as an easy and a fun way to learn and enjoy being able to watch videos and participate in the games on the OLR. As they are always connected they perceive digital learning is not difficult as they rate themselves as fast learners [Yr13S.02]. Rather than using course provided resources, they prefer to use their own resources and can "*look up what I need to know when I need to know it*" [Yr13S.16]. But there is a strong indication in the data of a greater preference for a traditional teaching model and that there is too much digital learning. Yr13 students have indicated a preference for pen and paper over laptops and one Yr13 student found that "*always using the computer for learning is annoying"* [Yr13S.33] while another preferred *"traditional learning experiences"* [Y13.60].

Participation in an OLR formed part of the data collection process and 81 Yr13 students logged on to and engaged actively with the resource. The first five sections of the OLR were an in-class session (from Page 1: Topic 1 to Activity: Crossword) that occurred during a timetabled class. The teacher was present while the researcher facilitated the session. Of the 84 Yr13 students who were present during this phase of data collection, 81 had access to digital devices and were able to log onto the site. The three Yr13 students who were unable to log on were all from the same class. While they had access to a digital device, a smartphone, their teacher advised that "*the school rules are no phones in the classroom and the [students] know the rule*" (Personal communication, Secondary School Teacher, 18 May 2017). The Yr13 students concerned informed the researcher that the only digital device their school will accept for in-class digital learning is a laptop or a tablet/iPad. In discussion with the three Yr13 students, two did not own a laptop but they both had access to a desktop at home [Yr13S.68; Yr13S.90] while the third Yr13 student had left their device as home as "the battery was dead" (Personal Communication Yr13.4, 18 May 2017).

The homework sessions (supported homework, homework activity, independent homework and homework activity) were designed as independent learning to occur outside of the classroom. While the LMS was developed to support the learning that was occurring in the classrooms there was a significant reduction in participation in the LMS for the independent learning sessions with 18 and 11 Yr13 students completing these sessions respectively. Figure 4.2 provides a summary of Yr13 student activity with the LMS component of this study

Figure 4.2.

Yr13 Student Learning Management System Student Activity Logs (N=81)



An explanation from the Yr13 students for this lack of participation was that the resource was not compulsory and there were no credits attached to it [Yr13S.80; Yr13S.01]. There was a strong indication overall in the data that Yr13 students were also interested in learning only information that was required for their assessments. The Yr13 students were also of the view that there is an increase in the amount of time required to complete digital learning. This was supported with the comments that extra work outside of the classroom is not welcomed. Eleven Yr13 students who did not complete all the sections of the resource indicated that time was a factor. Other factors that impacted on their ability to do this were not owning a computer or computers at school being always available [Yr13S.01], and

> *Pressure from internals [NZ assessments that test knowledge that cannot be assessed in an exams] etc also helped me forget about [the LMS] [Yr13S.37]*

The resource was developed to support in-class learning and data was collected to ensure the LMR coincided with the topic teaching scheduled and to be utilised as a study resource to complete assessment completions. Yr13 students who did not fully participate in the OLR reported, however, that

> *… [the OLR] distracted me from alternative class work. Other internals took priority [Yr13S.01]*
>
> *…had more important things to do [Yr13S.40]*
>
> *I didn't feel I would gain anything from it. I just didn't find a purpose for it [Yr13S.92]*

While the LMS content was developed in consultation with their Yr13 biology teachers there was also the view that the resources was not relevant to their learning and it included "*stuff I didn't need to learn*" [Yr13S.92]. Conversely, other Yr13 students reported that

> *The information that was in it was relevant to the topic and it was accessible anywhere due to its location on the internet [Yr13S.20}*

They stated that

> *…enjoyed the resource package as its preparing me for my upcoming externals [NZ assessments by examination] [Yr13S.33]*

and that it

> *Would be a good extra resource for revision at the end of the year [Yr13S.80]*

While the OLR had a positive impact on the digital confidence for some Yr13 students, they also wanted their teachers to be actively involved in their digital learning experiences.

4.2.1.2 Teacher support of digital confidence

The presence of the teacher in the classroom was important for some Yr13 students. Irrespective of the level of digital confidence, there was an indication in the data from twenty two Yr13 students that they wanted the teacher to have a presence during their digital learning journey. This presence included a preference of not engaging with digital devices

> *I'd rather listen to a teacher tell good information to use than go on laptop and try make my own notes for sources [Yr13S.86]*
>
> *If you chose to use digital technology they will help you if you have trouble [Yr13S.67]*
>
> *Teachers offer pathways that show us what to do [Yr13S.41]*

There is also an acknowledgement in the data of Yr13 student – teacher engagement occurring in the digital environment but also an indication of a preference for

> *…interacting with teachers on onenote more often [Yr13S.31]*

In some instances teachers did not allow digital devices in class [Yr13S.23] and because of this Yr13 students reported that they were underprepared for university digital requirements as

> *…our teacher doesn't want us to use laptop in class and prefers if we write our notes by hand [Yr13S.23]*

There was also a perceived expectation by teachers that Yr13 students are

> *…just expected to know how to use the tools or websites required to complete work or study [Yr13S.80]*

However, one Yr13 student who had a high level of digital confidence and who could "…*do everything that [was required"* [Yr13S.29] in the DLE, nevertheless perceived that the focus for digital learning in the class was one where

> *…most online school work involves write up rather than research/learning [Yr13S.29]*

While this Yr13 student believed they were well prepared for using digital technology for their post school pathway they also recognised that

….school can not prepare me for every system as systems change very rapidly. Everyone has a different pathway and school will never be able to provide this [Yr13S.29]

Yr13 students want teacher guidance and support with digital learning. They want to learn how to engage with digital platforms. One Yr13 student shared "*we are not taught how to use a computer except for assessment submissions*" [Yr13S.42]. Another Yr13 student shared they have been advised that "*nothing at school is relevant to uni*" [Yr13S.52]. The Yr13 students who participated in this study identified that instructions to assist them to navigate the digital environment would be helpful, as well as encouragement to participate in independent learning.

Yr13 students are requesting this guidance at secondary level, with one Yr13 student acknowledging Yr13 students need experience learning with digital courses. However, they do experience teachers who 1) ask students to turn their digital devices off; 2) have technology-free classes as a strategy to promote thinking; 3) would rather use books and 4) will not allow digital devices in the classroom. Yr13 students who are impacted by this tend to have limited/no digital learning opportunities at secondary school which creates a situation where Yr13 students believe "*uni resources are different to school*" [Yr13S.61].

For one Yr13 student their experience was that their teachers expected that they would be able to use digital teaching resources without requiring any teaching instruction. A concern that was evident during the Yr13 students' participation in the study's OLR was that they wanted more help with the OLR to know what it was they were required to do. OLR notifications were sent from the OLR by the researcher to the school email addresses. At one school Yr13 students did not receive the notifications as they did not realise the school email filter programme sent the OLR notification to their school spam email. Similarly, while there were Yr13 students whose experiences with digital learning had been very positive, they did not always contribute to the attainment of their digital skills to their skill experience. Their perception was that because they have grown up in the digital environment they

School teaches me stuff I already know [Y13S.14]

Use a variety of digital tech at home so school has no impact on my digital abilities [Yr13S.62]

Already know enough to be able to complete the work [Yr13S.67]

At the opposite end of the digital skills continuum were Yr13 students who described themselves as the generation who had been raised in the digital environment and who, due to their level of digital knowledge and exposure, found it easy to learn digitally [Yr13S.02].

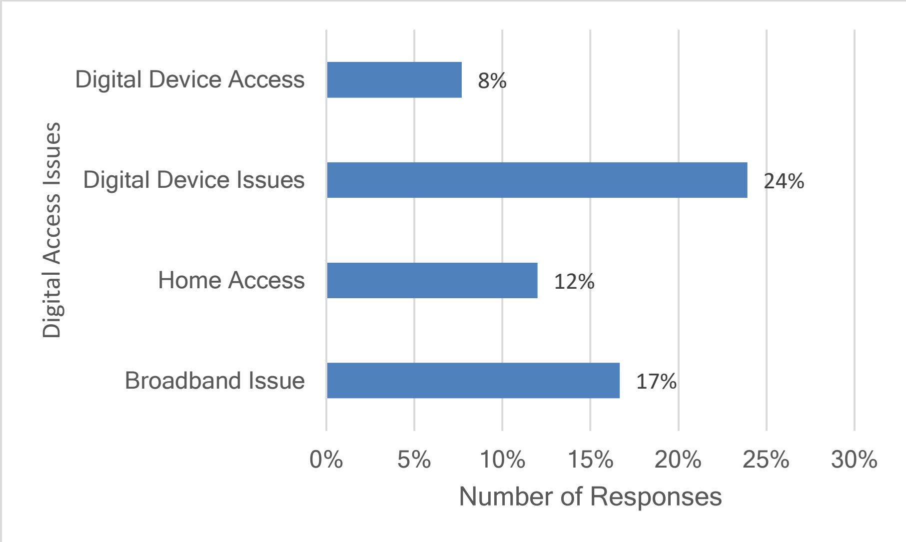
4.2.1.3 Student access to digital learning opportunities

The Yr13 students who participated in this study all attended secondary schools who had in place a BYOD policy and 95% the Yr13 students who were surveyed were aware of the policy. At secondary school there were different ways to manage access concerns. At one school, school computers and Chromebooks were available for both junior and senior students and the school booking system in place at one of the schools in this study meant Yr13 students could make a booking for a particular class or during their school breaks. However, at another school the school provided devices were not available for senior students and senior students were required to BYOD (Personal communication). One of the challenges is that these school resources were not always available for senior school students and the expectation was that they would provide their own device.

At school there are a variety of ways for Yr13 students to access digital resources and participate in classroom based learning. Outside of the classroom Yr13 students may experience challenges at home that impact on their ability to participate in independent digital learning activities (Figure 4.3).

Figure 4.3.

Yr13 Student Factors Affecting Access to Digital Learning Opportunities (N=56)



In this study there were Yr13 students who had no digital access at home. This was because there was either no device (8%) or no digital connectivity (17%), with 24% of Yr13 students surveyed experiencing some form of issue with their digital device at the time this research was conducted.

Yr13 students identified that the strategies that were implemented by their respective secondary schools had a range of impacts across their digital learning continuum. For some students this continuum ranged from an appropriate level of experience to no opportunities to access digital learning opportunities. Student learning preferences equally varied from confident digital participation to a preference for a traditional type of delivery. Digital connectivity had an impact on these preferences.

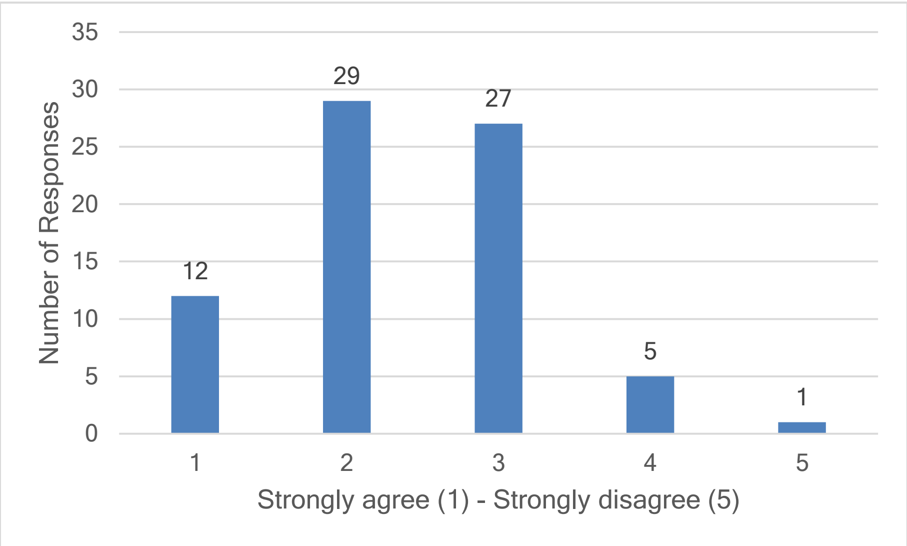
4.2.2 Yr13 Student: Student preparation for UG studies in a digital environment

The second theme that emerged from the data was Yr13 student preparation for UG studies in a digital environment. The theme is focused on how Yr13 students perceive their secondary schooling is preparing them for the progression into the DLE of the tertiary sector. This theme was characterised by uncertainty regarding the UG DLE and factors that impact on the Yr13 students' ability to develop the digital confidence needed for the progression to this digitally focused environment. This theme includes the transition pathways and digital challenges that Yr13 students experience as part of this preparation.

Using a 5 point Likert scale across the five points of (1) strongly agree, (2) agree, (3) neutral level of agreement, (4) disagree (5) strongly disagree Yr13 students were asked to describe their experience of Yr13 preparing them for work and/or study in the digital environment. Seventy four Yr13 students answered this question and 92% of the respondents describe their preparation for the digital environment at a score of 3 or higher that is, neutral level of agreement to strongly agree (Figure 4.4).

Figure 4.4.

Yr13 Student Preparation for the Digital Environment (N=74)



Only one Yr13 student strongly disagreed (5 on the Likert scale] that Yr13 was preparing them for the post school digital environment. This student intended to progress into tertiary studies from secondary school, and reported having a high level of confidence in their digital abilities for their post school pathways. They attributed this confidence to their digital exposure outside of the classroom and that they had a parent who was employed in the "*tech industry so I have grown up around technology*" [Yr13S.62]. This student enjoyed the freedom that digital learning provided and the ability to source their own resources to support their learning. Growing up around technology was also a factor for one Yr13 student who strongly agreed (1 on the Likert scale) that they were being prepared for the post school digital environment. In this student's view

> *Digital technology has become more common in school and this helps familiarising yourself with digital tech [Yr13S.04]*

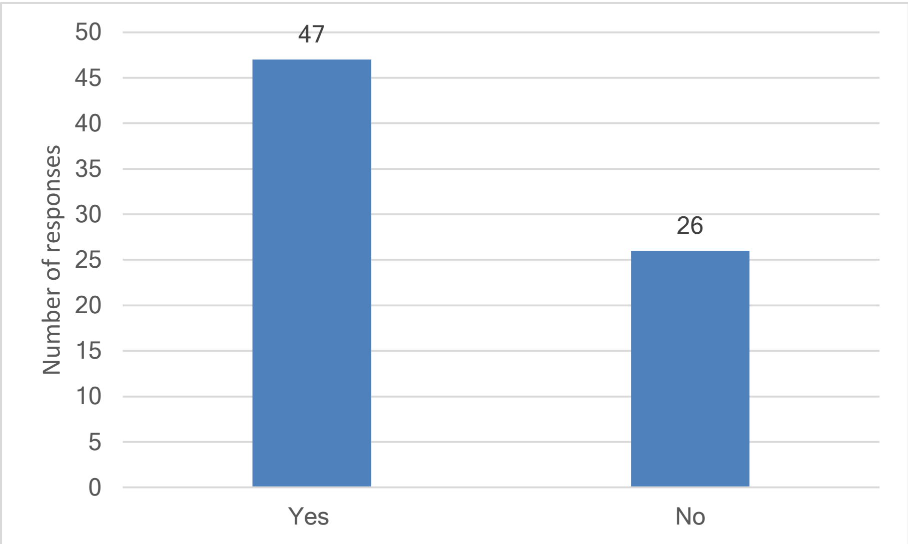
This Yr13 student expected that tertiary study will involve using digital technology.

4.2.2.1 Preparation for the post school digital environment

While the majority of Yr13 students identified that secondary school is preparing them for the post school digital environment there was a difference in the data when Yr13 students were asked to consider if they believed school was preparing them to use digital technology in their immediate future. Seventy four Yr13 students answered this question, with 47 Yr13 students, or 63% of the study cohort, responding 'yes' to this question (Figure 4.5).

Figure 4.5.

Is Secondary School Preparing Yr13 Student's for the Post School Digital Environment? (N=74)



The data revealed that 26 (35%) Yr13 students whose post school pathway was the progression into UG studies perceived they were unprepared for the post school digital environment because they

> *…are just expected to know how to use the tools or the websites to complete work or study [Yr13S.80]*
>
> *…have heard digital learning is prominent at university and I don't know whether what we do at school is the same or relevant to university [Yr13S.52]*

Another Yr13 student reported that at secondary school

> *….they do not teach use anything except of the compulsory ICT [information communication technology] in Year 9 which they teach us stuff we already know [Yr13S.14]*

Several students expressed these feelings of uncertainty [Y13.44; Yr13.46]. For example, one Yr13 student who intended to progress from secondary school into UG studies was concerned that they did not know what to expect at university:

> *...unsure as I don't know how my study will be in the future [Yr13S.66]*

One Yr13 student simply stated "*I have no idea*" [Yr13S.41] when asked to consider how they expected to learn at university and one Yr13 student did not know what to expect when they entered UG studies as their view of digital technology was

> *…its [digital technology] also not teaching me so its more of a medium. I just don't feel super super confident [Yr13S.46]*

One Yr13 student [Yr13S.02] who responded 'no' to the question whether they believed school was preparing them to use digital technology in their immediate future, reported having greater access and exposure to digital technology

> *…at home but not school. School has no impact on my tech [sic] preparation [Yr13S.02]*

This Yr13 student also disagreed that secondary school prepared them for the post school digital environment. This Yr13 student indicated that they were very confident using digital technology for learning. While they had taken two years of computer science class prior to their final year of schooling they identified they would like to develop their digital skills in the areas of communicating with their teacher and participating in online courses to support their learning in the classroom. When they entered tertiary studies they expected they would be watching "*lots of YouTube videos*" and using digital technology

> *…mainly as a study tool and for my social interactions [Yr13S.02]*

This perception of what the use of digital technology use would look like at university was also shared by other Yr13 students who believed that it was mainly document and/or assessment focused. The expectation was that they will

> *….type up documents and that's all I need for my university degree [Yr13S.13]*

and that

> *School is preparing us because we use technology for our assessments [Yr13S.42]*

The reference to assessments was also noted by one Yr13 student who expected that university will be

> *…more hands on but I will hopefully be able to use my device for assignments [Yr13S.38]*

In terms of their preparation for the transition from secondary school to university, one Yr13 student identified that

> *In terms of studying if I went and go to a university I believe I would be prepared enough from school to use digital technology [Yr13S.26]*

An alternative view that Yr13 students are being prepared for university was expressed by the following Yr13 student, who believed that school is preparing students only for the university post-school pathway as

> *Everything that school teaches us isn't really useful unless you are going to uni [Yr13S.34]*

However, one Yr13 student who intended to progress immediately into tertiary study on completion of their secondary school acknowledged that learning at university will occur "*digitally via devices*" [Yr13S.15]. This Yr13 student recognised that in the future digital technology will be used

> *For everything, devices [will] become more apparent as time progresses [Yr13S.15]*

This student also believed that they are not prepared for digitally focused learning as they

> *Have not personally experienced any digital learning to help develop skills for online digital work [Yr13S.15]*

It is not clear from the data why this Yr13 student believed that they have not had the opportunity to participate in digital learning to develop their digital skills. They attended a secondary school with a BYOD policy, had access to a digital device during class times and were exposed to in class digital device use. They also participated in a number of school related digital activities including accessing digital resources, worked on a group project online and accessed a forum post.

The view of a successful progression into their post school pathways was influenced by the digital learning challenges faced by Yr13 students. This was also a factor that impacted on their preparation for tertiary studies.

4.2.2.2 Digital learning challenges

The Yr13 student participants identified challenges that had an impact on their digital learning experience. These included Yr13 student self-determined priorities such as homework and extracurricular activities, and the distractions offered by digital technology.

In secondary school independent learning is referred to as homework, and there is an indication in the data that not all Yr13 students see homework as a priority. One Yr13 student stated for example that "*they didn't like the deadlines especially for the homework sessions*" [Yr13S.52]. They reported that they want to do schoolwork during school hours only and any homework assigned must contribute to the credits awarded for their internal or external assessments to be considered a priority. This view was supported by another Yr13 student who provided feedback that

> *Year 13's/teenagers don't like extra unnecessary work [Yr13S.41]*

It is evident from the data that Yr13 students do have commitments outside school that impact on their ability to participate in independent learning, and that there is a decreased interest in independent learning if it is not compulsory [Yr13S.02]. Of the Yr13 students surveyed 17% indicated there were a number of extra curricula activities that impacted on their ability to participate in independent learning. For some students, these were cultural activities:

> *I'm a dancer and didn't get home until 9:30pm so didn't have time for homework [Yr13S.18]*

Four Yr13 students who identified that their priorities were having an impact on their school work included "work" commitments [Yr13S.27]. A further four Yr13 students mentioned sporting commitments, while five Yr13 students cited "other" as their extracurricular activities that impacted on their ability to participate in independent learning.

4.2.2.3 Distractions offered by digital technology

The feedback received from Yr13 students revealed that digitally focused learning can be "boring" and that they find that they become distracted from classroom content when searching for their own digital resources. They believe accessing own resources is a more worthwhile use of their classroom time. Eleven Yr13 students indicated that digital technology offers distractions that have an impact on their learning. There is an acknowledgement in the data of the "*ease of use*" [Yr13S.69] of digital technology. This particular Yr13 student also identified that digital technology is "*more efficient than pen & paper/books*" [Yr13S.69]. However, the accessibility of digitally focused distractions was a factor that two Yr13 student did not like about digital learning [Yr13S.69; Yr13S.02]. There were several Yr13 students for whom digital technology was found to be a distraction:

> *…easy to get distracted and go off task [Yr13S.12]*
>
> *…bothers you sometimes like when you can't help yourself from going on Facebok [sic] and watching movies or playing games [Yr13S.73]*
>
> *…more of a distraction as we have access to the internet to access different websites than focus on the tasks we are intended [Yr13S.82]*

The impact of the distractions offered by digital technology also affected Yr13 student confidence. There was the acknowledgement from one Yr13 student that they were

> *Not very [confident using digital technology for learning] because you prefer to visit some other sites or play games instead [Yr13S.73]*

This Yr13 student, whose planned post-school pathway was university study, also recognised the need for a change of their digital focus to be successful at university as follows:

> *Firstly I have to be more confident to work individually and self-learning more than distractions in class [Yr13S.73]*

Social media also provided distractions to the Yr13 student digital learning experience and students acknowledged that

> *I get distracted easily and go on Facebook or play weird games [Yr13S.17]*
>
> *[It] can be distracting [to] have social media as readily available as other information [Yr13S.53]*
>
> *…sometimes like when you can't help yourself from going on facebok [sic] and watching movies or playing games [Yr13S.73]*

This Yr13 student was very confident in the digital environment but not very confident using digital technology for learning because they sometimes preferred to visit other sites or play games instead of participating in their digitally focused learning [Yr13S.73].

In response to the question of how they expected to learn at university, another Yr13 student who planned to progress to university the following year acknowledged the distractions digital devices provided:

> *It distracts me from working and then I feel like going on youtube [sic] which isn't going to get my work completed [Yr13S.06]*

According to one Yr13 student, one of the benefits of using the Internet and digital devices for learning is that you can "*access from anywhere*" but "*distractions are endless*" [Yr13S.51). Yr13 students identified a number of factors that impacted on their preparation for tertiary studies. There was a range of views presented regarding their transition pathway preparation. For some students there was a degree of uncertainty while other students were feeling well prepared. Digital distraction was a factor that impacted on their preparation. Yr13 students generally acknowledged the distractions that their devices offered and there were times when they found the Internet more interesting than their learning activities.

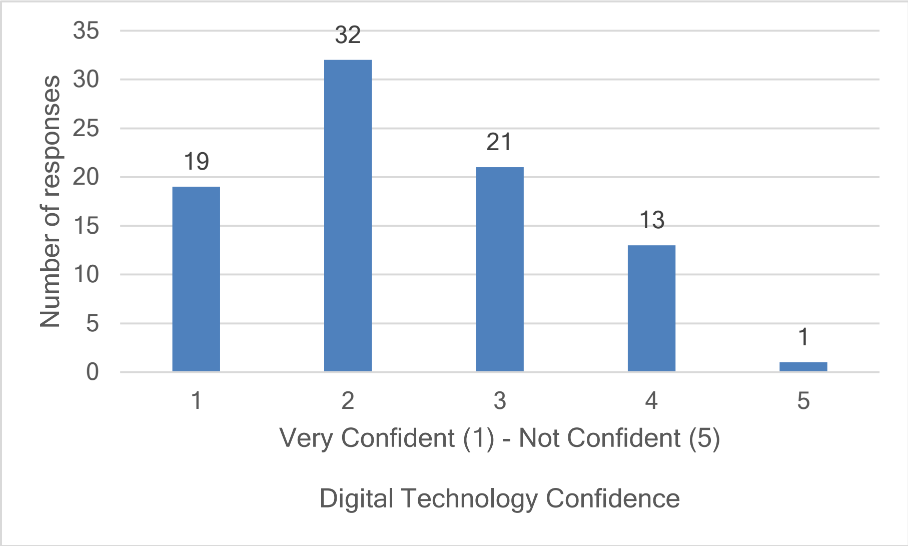
4.2.3 Yr13 Student: Confidence for digital learning

The third theme to be discussed for this participant group is confidence for digital learning. The presence of digital confidence in a DLE enables students to successfully engage with digital technology for the specific purpose of learning. The Yr13 student participant group identified aspects from the Yr13 student experience that are influenced by their access to learning opportunities and digital resources. These aspects are related to the theme of confidence for digital learning which encompasses the factors that impact on their digital learning experience. These factors include the Yr13 students' level of digital exposure during their secondary school, their level of digital literacy, their motivation to participate in the DLE and their birth cohort (Section 2.4.2 of the Chapter 2).

Using a 5 point Likert scale across the five points of (1) very confident, (2) confident, (3) neutral level of confidence, (4) slightly not confident (5) not confident, Yr13 students were asked to describe their confidence using digital technology in general at the point of data collection. Eighty six Yr13 students answered this question and 83% of the respondents rated their confidence at a score of 3 or higher, that is, neutral to very confident (Figure 4.6).

Figure 4.6.

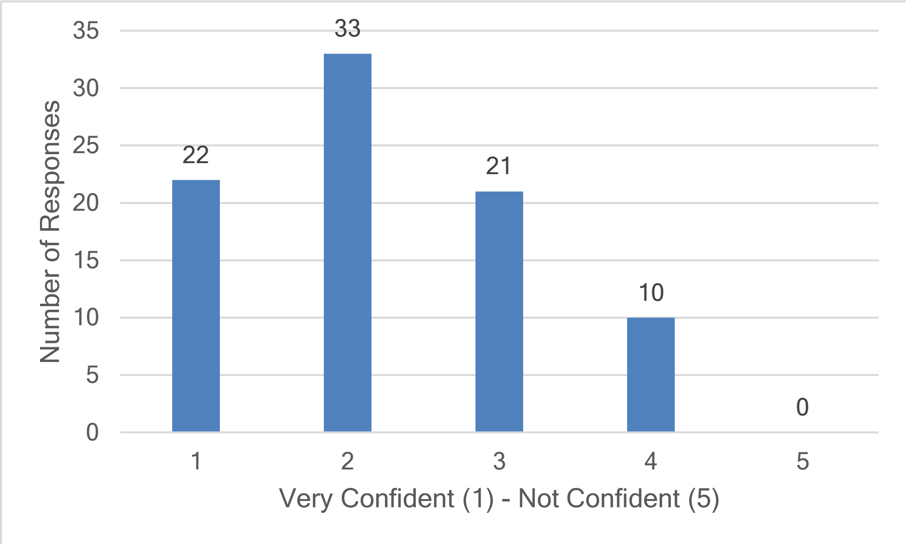
Yr13 Student Digital Technology Confidence (N=86)



Using the same 5 point Likert scaling Yr13 students were then asked to describe their confidence using digital technology for their school work. There was a slight increase in the Yr13 students' level of confidence. Eighty-six Yr13 students answered this question, and of that group 88% of the respondents rated their confidence in using digital technology for learning at a score of 3 or higher, that is, neutral to very confident (Figure 4.7).

Figure 4.7.

Yr13 Student Digital Learning Confidence for School Work Purposes (N=86)



Twenty five Yr13 students (29% of respondents) indicated that they had a higher level of confidence when using digital technology for their school work. Students who provided further information explained this difference in confidence using digital technology for their school work as follows:

> *I'm fairly confident [using digital technology for school work] although I don't understand how to operate all sites and devices [Yr13S.07]*
>
> *I am able to research topics for example biology and make internal documents for assessments [Yr13S.22]*
>
> *I know how to do the basic core activities on the computer for learning [Yr13S.61]*

The use of digital technology to support the completion of assessment related work was identified by 28 (30%) of Yr13 students participants. For two students, their primary use of digital technology was to access past exam papers [Yr13S.21; Yr13S.77]. However, the need to be confident in undertaking assessment related work was also expressed by one student [Yr13S.84]. For another Yr13 student who needed "*a hand for most tasks*"

[Yr13S.27], receiving support in the classroom to manage using digital technology for school work meant increased confidence in using digital technology for school work.

Three Yr13 students attributed the difference in confidence between using digital technology and using digital technology for learning to the fact that the school used basic programmes for learning [Yr13S.78; Yr13S.19; Yr13S.29]. One of these three Yr13 students [Yr13S.78], who reported being very confident using digital technology for school work (1 on the Likert scale), identified that the school web filters restricted their ability to fully develop their digital confidence (2 on the Likert scale). They explained that

> *School requires limit[ed] use of digital programs, with the most complex being word, spread sheet and occasionally other programs designed towards school age children – hence they are easy to use [Yr13S.78]*

Conversely, eleven (13%) Yr13 students indicated a negative difference between levels of confidence with digital technology and using digital technology for school work. One Yr13 student attributed this change to the impact of their teacher:

> *When teachers are checking my work, I lose [sic] confident about my work on my laptop because of the way I type out my assessments [Yr13S.06]*

There were also students who rated their level of confidence with digital technology as very confident (1 on the Likert Scale) but then stated that there was a reduction in their level of confidence to neutral on the Likert scale (3) when using digital technology for school work. They attributed this difference to their ability to effectively use the Internet to meet their learning needs as they were

> *…normally [able to] meet requirements for digital use in assessments but would not exceed expectations [Yr13S.16]*
>
> *Not great at research. Internet is horrible but I'm not completely useless [Yr13S.46]*

The view that the Internet has a negative impact on their learning experience was supported by another Yr13 student [Yr13S.41]. This student also reported a reduction in their confidence using digital technology for school work from being very confident (1 on the Likert

Scale) to a neutral level of confidence (3 on the Likert Scale). This student attributed the difference in confidence to the fact that there were issues with the school digital infrastructure which prevented them fully participating in digital learning opportunities:

> *Internet doesn't work so we don't get much done on them so we don't become confident [Yr13S.41]*

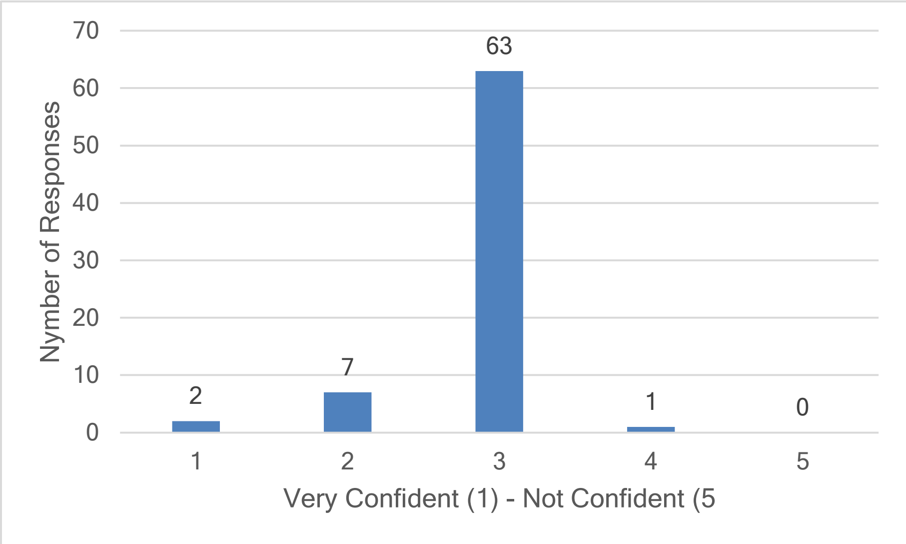
The digital infrastructure issue was also raised by another student [Yr13S.16] who highlighted the negative impact that the reliability of their school's digital infrastructure had on their learning, and the impact of the school web filter which prevented them from accessing resources they perceived were relevant to their learning. There was also a decrease in digital confidence that was attributed to the digital programmes that are being utilised by the school and the ease of navigation around these. The student experience has been that

> *Most programs are confusing and do not get explained on how and why we are using it [Yr13S.11]*

All Yr13 students in this study had been provided the opportunity to participate in digitally focused programs and had used digital technology for the purpose of learning within seven days of the Yr13QS being completed. As explained in Section 3.4.2.2 of Chapter 3 an online learning resource (OLR) containing a number of online activities was developed to provide Yr13 students with the opportunity to reflect on their level of confidence in navigating an OLR for the specific purpose of learning. After having had the opportunity to participate in the OLR, using a 5 point Likert scale across the five points of (1) more confident, (2) confident, (3) no change, (4) confident (5) less confident, Yr13 students were then asked if there had been a change in their confidence using digital technology for their school work. This question was answered by 73 Yr13 students and the majority of Yr13 students (86%) reported no change in their confidence levels post participation in the OLR (Figure 4.8).

Figure 4.8.

Improvement in Yr13 Student Digital Confidence Levels Post OLR (N=73)



Most Yr13 students experienced no change in their confidence levels following OLR participation and 49% of this group of respondents related this response to their level of skills in the digital environment. Overall the previous experience in the digital environment meant the OLR did not increase their understanding of or confidence in using digital technology for the purpose of learning. For example, one Yr13 student identified that "*I was already very confident with using technology in school so couldn't really improve too much*" [Yr13.28]. This level of confidence was also expressed by a student who felt that during their engagement with the OLR that their

> *…effort and motivation to change my confidence was not high has I felt I already knew enough to complete my work to an appropriate standard without issues* [Yr13.10]

For another student "*it didn't really challenge my digital ability*" [Yr13.18] or add value to the completion of their assessments. This Yr13 student used digital technology in the classroom a few times a week and believed that due to their chosen UG programme pathway school was not preparing them for tertiary studies.

The digital ability of students and their previous experience accessing digital resources was also acknowledged by another Yr13 student who already knew

> *…how to use the resources like accessing videos and posting in the forum I am very familiar/confident with technology in general [Yr13.20]*

This Yr13 student reported having been exposed to digitally focused learning in most classes during the school week

> *Because most of my class work is based online now since they converted the change from pen/paper and text/workbooks [Yr13.20]*

Due to the high level of digital exposure they identified they were prepared to use digital technology in their UG study. Although this Yr13 student enjoyed using digital technology for the purpose of learning, they also acknowledged that

> *I think better using pen and paper. Internet can be a distraction to learning [Yr13.20]*

Another Yr13 student who indicated that they experienced no change in their level of confidence post OLR participation had completed 60% of the OLR and found that "*using technology in general is very simple*" [Yr13S.31]. While they had used digital technology in the classroom in a few classes at the time of data collection they did indicate that they spent, on average, 70 hours per week using digital technology. A significant number of these hours, were dedicated to their smartphone as they used their "*phone all the time for games & for my social accounts*" [Yr13S.31]. They reported their ability to fully participate in the OLR had been affected by the instructions that were provided by the researcher with regard to "*where and what I was supposed to do*" [Yr13S.31]. For this Yr13 student,

> *…the instruction to do something decides if the user will have a[n] easy or hard time completing a task, therefore my confidence in using digital technology after [participating with the OLR] is still the same [Yr13S.31]*

Another Yr13 student who also reported no change in the level of confidence after participating in the OLR remarked that

The information and resources that were provided [in the OLR] was [sic] good and relevant for the task. I didn't really know how to use it confidently [Yr13S.7]

In response to the question of whether or not their secondary schooling is preparing them to use digital technology in their post school pathways, this Yr13 student reported that they are being prepared to use digital technology, but that they

Have not been taught how to use digital resources or devices efficiently. Although they [secondary school] do teach the basics on computers and websites [Yr13S.7]

Nine Yr13 students (12%) reported an improvement in their level of confidence after participating in the OLR. For one student the improved level of confidence meant that they felt

…more comfortable using Moodle and using forums [Yr13S.59]

Another Yr13 student specifically attributed the positive change in their level of confidence using digital technology to their participation in this research project and the OLR:

Over the course of this survey we have been on the internet a lot which has helped me get use to using digital technology for school work [Yr13S.27]

However, while several Yr13 students expressed feeling more confident in the DLE after participating in the OLR, they also shared that digital learning was not their preferred style of learning. They found it was

…easier to remember things if I write it down by hand rather than computer [Yr13S.27]

and confessed that they

… don't enjoy this kind of learning, I prefer notes etc [Yr13S.16]

However, this Yr13 student [Yr13S.16] also preferred to locate their own digital learning resources and reported that digital learning was

Much more efficient in terms of completing work and having access to resources [Yr13S.16]

Yr13 student participants acknowledged motivation for learning as a factor in their participation in digital learning. Yr13 students also identified difficulty with their motivation levels when required to participate in independent learning. While the OLR was developed to support in-class learning, one Yr13 student admitted that "*I just didn't want to [participate in the OLR] as I didn't feel I would gain anything from it*" [Yr13S.46]. Another Yr13 student who acknowledged the relevance of the LMR and that it was "*an extra source of information or practice*" indicated the ability to participate in a LMR was affected by "*motivation levels and [the independent learning] slipped my mind"* [Yr13S.80]. Another Yr13 student acknowledged that because they possessed a level of confidence using digital technology for the purpose of learning and because they had already attained the knowledge required for their internal assessments

> *My effort and motivation to change my confidence [level] was not high as I felt I already knew enough to complete my work [internal assessments] to an appropriate standard without issues [Yr13S.80]*

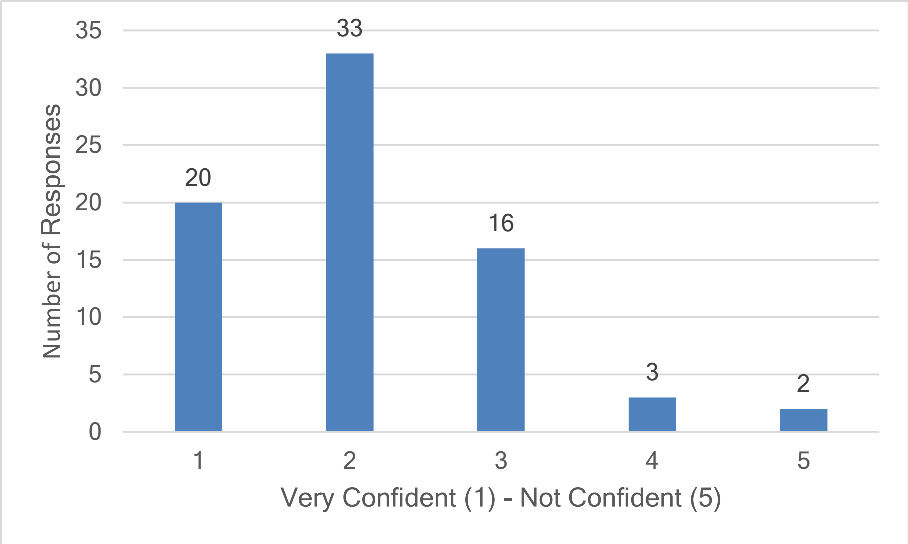
This Yr13 student also indicated that secondary school is not preparing them to use digital technology in their immediate future as

> *We are just expected to know how to use the [digital] tools or websites required to complete work or study [Yr13S.80]*

In terms of their use of digital technology in their immediate future Yr13 students were asked to consider what their digital confidence for their future transition pathways was. Yr13 students were asked to rank their level of confidence using a 5 point Likert scale across the five points of (1) very confident, (2) confident, (3) neutral level of confidence, (4) slightly not confident, (5) not confident. Seventy four Yr13 students answered this question with 93% of the respondents describing their confidence in using digital technology in the future at a score of score of 3 or higher that is, neutral to very confident (Figure 4.9).

Figure 4.9.

Yr13 Student Digital Confidence for Future Work and/or Study Plans Post OLR (N=74)



Five Yr13 students assigned a grade of more than 3 for this question, that is, slightly not confident or not confident, and their feedback included that during their secondary schooling they

> *…have not been taught how to use digital resources or devices efficiently [Yr13S.7]*

While this Yr13 student reported being very confident using digital technology they also indicated that at school they were only taught "*the basics on computers and websites*" [Yr13S.7]. This Yr13 student attributed their confidence to the fact that they had been using digital devices from the age of 8 years old. Another Yr13 student stated that their low level of confidence was because

> *I do not know what I am expected to understand so I am unsure and my confidence would depend on the program the work is being done on [Yr13S.15]*

While this Yr13 student's secondary school had a BYOD policy in place, the student did not own a school approved digital device. They were required to use the school's digital devices, and as a result identified this inequity as one of the things they do not like about digital learning, because

…some people are not able to bring a device to school [Yr13S.15]

Another Yr13 felt confident enough that

I have enough knowledge to work [it] out. Not fast but I can [Yr13S.45]

To support Yr13 students to utilise digital technology confidently with their after school plan one Yr13 student identified that there needed to be

…a course which help[s] us understand how to sift through the internet and gather only the needed material when researching something [Yr13S.27]

However, another Yr13 student believed that the

Use [of] a variety technology every single day builds up technological skills which can open up pathway to a successful career with technology [Yr13S.57]

In response to the question that asked Yr13 students to identify the digital technology skills that they thought they needed to learn in order to help them with their intended afterschool plan, the same student perceived that

Basic laptop or computer skills would be all that is required [Yr13S.57]

Yr13 students identified a number of digital experiences that impacted on their confidence for digital learning. Overall, the majority of Yr13 students reported a high level of confidence using digital technology for learning. Assessment submission was a factor that influenced their confidence along with the stability of their school’s digital infrastructure. However, motivation for learning also affected their ability to engage with digital resources and develop their confidence for their post-school pathways. Of the Yr13 students who participated in this research, the majority (52%) intended to progress directly into full-time UG study from secondary school.

4.2.4 Yr13 Student: Student learning preferences

The fourth and final theme that emerged from the data was Yr13 student learning preferences. This theme is focused on the factors that influence the Yr13 student learning preferences. It recognises that the learning characteristics, preferences and needs of Yr13 students are varied and can impact, both positively and negatively, the adoption of digital technology as a tool for learning. Also the impact on the teacher on their ability to develop their digital confidence. The data revealed that Yr13 student learning preferences ranged across a continuum from preferring traditional style learning where the focus is on the use of textbooks and writing in their books to enjoying emersion in the digital environment. Fifteen Yr13 students (17%) indicated a preference for traditional learning opportunities in the classroom. For example, one Yr13 who was very confident using digital technology for learning believed that digital technology is "*the way of the world*" [Yr13S.82].

However, two Yr13 students acknowledged that

> *Often learning through digital device can be harder as it is a non physical thing eg. I find I will remember something better if I write it down rather than type it [Yr13S.55]*
>
> *Sometimes it can be hard to retain information read[ing] on a screen compared to writing everything out on paper [Yr13S.82]*

while one Yr13 student indicated that they

> *…like to study my notes from my scipad [textbook] and from my teacher [Yr13S.82]*

Another Yr13 student with a neutral level of confidence using digital technology for their school work explained this was related to only using "*it [digital technology] for research. I take notes by hand*" [Yr13S.28]. In terms of what digital technology skills they would like to help them with their digital learning this Yr13 student stated:

> *…don't know exactly, try to avoid computers [Yr13S.28]*

While the data seems to suggest that there is a preference for "*books or [to] read notes*" [Yr13S.02; Yr13S.16], Yr13 students also thought that as a generation they are

> *…fast to learn new online digital tools [Yr13S.02] and*
>
> *I started using digital devices [when I was] about 8 yo [years old] so I know how to use the keyboard [Yr13S.76]*

Although some students reported using digital devices from a young age and being very confident using digital technology for learning [Yr13S.76], when asked what they do not like about using digital technology for learning they responded that one of the drawbacks of digital technology is

> *Not tactile unable to grasp information as easy as on paper [Yr13S.29]*
>
> *…you can't circle, highlight, annotate, etc, on question and all of my work is not in the same space [Yr13S.70]*
>
> *No paper feeling. Notes taking experience are way worse than traditional note taking [Yr13S.76]*

The majority of Yr13 students acknowledged the positive aspects of digital learning and the general feedback was that the digital environment is "*good for assessments. Good for research*" [Yr13S.02]. Nonetheless, this Yr13 student reported that digital learning was not "*good for science*" [Yr13S.02] and that it was

> *…better to write out notes rather than type = better process [Yr13S.02]*

This Yr13 student also expected that digital technology use in the future would be "*the same as it is now*" [Yr13S.02]. There was a view that using digital resources were there to

> *…add on materials instead of the main study method [Yr13S.60]*

The Yr13 student experience is varied. One Yr13 student who was very confident using digital technology shared that having to "*use the computer all the time was annoying*" [Yr13S.33] as they "*don't really like using it much for school*" [Yr13S.33]. Another Yr13 student who attended a school which did not have BYOD policy, reported feeling reasonably confident using digital technology, but conceded that

> *It's not really my thing but I don't really have a chose [sic] because of how school gets information to the students [Yr13S.25]*

In the data there was a tension evident where students acknowledged the advantages of the DLE, while at the same time recognising their learning challenges. This tension is captured by one Yr13 student [Yr13S.55] who, on the one hand, appreciated the opportunities the DLE provides but on the other hand, the same student also stated that

Often learning through digital device can be harder as it is a non-physical thing eg. I find I will remember something better if I write it down rather than type it [Yr13S.55]

Yet, there is an acknowledgement in the data that in the future they

…expect for a lot more things to be digitalised, most school learning will be done digitally [Yr13S.55]

For one Yr13 student who was not confident using digital technology and who spent time "*trying to avoid using computers*" [Yr13S.88] their issue was with

The complex understanding of technology, I don't know how to use technology/devices apart from the simple task such as checking emails, Facebook or schoolwork on DOC's [documents] [Yr13S.88]

Another Yr13 student did not seem to appreciate the connection between digital technology and online learning, claiming that

Using digital technology was not necessarily beneficial as it is just as easy to look up online or get taught in class [Yr13S.25]

The Yr13 student learning preferences ranged across the continuum. The Yr13 students who participated in this study acknowledged that digital technology in learning is the way of the future, but there was also a preference for some students for traditional learning experiences. The way the digital environment is implemented by secondary school teachers to support Yr13 student digital knowledge and skill development was also a factor that was identified by this participant group, which is discussed next.

4.2.4.1 Student knowledge and skill development

A view that is consistent with the Yr13 student experience of teacher expectations is that Yr13 students feel they are expected to intuitively know how to utilise the required range of software.

Yr13 students identified the main use of digital technology during their schooling was for assessment submissions and there were limited opportunities to participate in digital learning at school. For Yr13 students who were confident with their level of digital knowledge, their digital skills were self-taught. There is a view expressed in the data that because Yr13 students are engaged with digital technology on a daily basis there is no new learning for them in the DLE. They know how to use digital technology. With regard to software use in the classroom Yr13 students perceived they either already have acquired the digital knowledge required or they utilise digital technology to "*look up what I need to know when I need to know it*" [Yr13S.16]. For one Yr13 student, the use of digital technology at school was a choice and their experience was that teacher support was offered to enable them to use the technology to achieve their outcomes.

The concern for Yr13 students was that secondary school only teaches what they refer to as the basics. In terms of what Yr13 students believed, they need to be successful in their first year of tertiary study. They wanted the opportunity to develop their digital skills and to learn researching skills, APA and how to find information for their assessments more easily. However, one Yr13 student participant shared that they were

> *Not taught at school how to use applications, [we are] just expected to be able to do it [Yr13S.80]*

This view was not isolated. The expectation that Yr13 students today know how to intuitively use digital technology was also expressed by a fellow student participant who perceived that the preparation of Yr13 students to use digital technology in their post school pathways

> *…isn't schools focus. As much as digital technology is primary in this day and age we are expected to just figure things out [Yr13S.87]*

This student acknowledged that they are confident using digital technology for learning as

> *Just always use the internet so it was never very difficult [Yr13S.87]*

Another Yr13 student indicated that

> *In my opinion school does encourage us to use our digital devices, however some teachers would rather us use books, so it's really a "half-in-half" situation in regards to school preparing us for the future [Yr13S.36]*

The lack of development of digital skills and knowledge in secondary school is expressed by another Yr13 student who responded no to the question regarding whether school was preparing them to use digital technology for work and/or study in the immediate future, because

> *…they [teachers] do not teach us anything expect for compulsory ICT [information and communication technology] in Yr9 which they tell us stuff we already know [Yr13S.14]*

Yet another Yr13 student perceived that there was an expectation by teachers that Yr13 students

> *…know how to use the tools and websites required to complete work or study [Yr13S.80]*

The same Yr13 student, when asked to think about their post-school interaction with digital technology, admitted that

> *…[I] do not know what I am expected to understand [for my after-school plan] so I am unsure [of what digital skills I need to learn] [Yr13S.80]*

While this was not an isolated experience, all Yr13 students were worried about whether or not they had been taught how to use digital technology for the purpose of learning [Yr13S.07; Yr13S.15]. According to one Yr13 student their school had only just introduced digital technology in their final year of secondary schooling which affected their confidence [Yr13S.32].

Yr13 students identified that digitally focused knowledge and skill development were an important aspect of their learning preferences. While students want a variety of learning experiences from traditional to digitally focused, they also want to be able to participate in their digitally focused future. Their digital confidence is dependent on their level of digital exposure and school having the infrastructure in place to support the development of their digital confidence is important.

4.2.5 Yr13: Summary of findings

The analysis of the data for the Yr13Q, OLR and Yr13PQ for the Yr13 students presented in this section revealed the emergence of four main themes: (1) Supporting the development of student digital confidence through digital responsiveness (2) Student preparation for tertiary studies; (3) Student confidence for digital learning and (4) Student learning preferences (Table 4.1). Emerging sub-themes were student preferences, teacher support for digital confidence, student access to digital opportunities (Theme 1), transition pathways, digital challenges (Theme 2), access to digital learning opportunities, access to digital resources (Theme 3), student knowledge and skill development, and educator approach (Theme 4). The data analysis captured the Yr13 experiences of their participation in, confidence with, knowledge and utilisation of digital literacy skills in their secondary school digital learning experiences. They shared their perceptions of their digital preparation of their post-school pathways and the challenges they have experienced in the development of confidence, knowledge and digital literacy skills to enable them to participate in these pathways.

The second participant group in this study was the first year UG students and the results of the analysis of the data collected from this participant group are discussed in the next section.

4.3 First Year UG Students

This section presents the findings of the research study undertaken to address the third research question related to the UG student learning experience with digital technology:

3. What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?

Using the principles of thematic framework analysis as discussed in the previous chapter (Section 3.5) the same four main themes as for Yr13 biology students emerged from the data for UG student participant group in response to the research question, namely, (1) supporting the development of student digital confidence, (2) student preparation for tertiary studies, (3) confidence for digital learning and (4) student learning preferences. It was anticipated that there would be strong similarities between the two groups of participants as 41% of the UG student participants had transitioned into tertiary studies within 6 months of finishing their Yr13 secondary schooling year at the time of data collection. Furthermore, the purpose of the TSSQ was to capture UG student reflections on their level of preparedness for digitally focused learning at tertiary level. The questions in the TSSQ corresponded to the focus of the Yr13PQ questionnaire to support a comparison of the experiences of the two participant groups during data analysis as explained in Section 3.4.3 of the previous chapter. Nonetheless, the emerging sub-themes from UG student data were slightly different from the Yr13 student data, and consisted of curriculum, digital resources (Theme 1), secondary school preparation, digital learning preparation (Theme 2), access to digital learning opportunities, access to digital resources (Theme 3), student learning, educator approach (Theme 4).

The data presented in this section is based on 88 UG students who completed the TSSQ. The alignment of the research question, themes, sub-themes and index categories are summarised in Table 4.3. The findings for this participant group are reported in Section 4.3.1 to Section 4.3.4 respectively.

Table 4.3

UG Student: Relationship Between Research Question 3, Themes, Sub-themes and Index Categories

Themes	Sub-themes	Index
Research question 3: What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?		
Supporting the development of student digital confidence through digital responsiveness (4.3.1)	Curriculum Digital resources	Digital orientation Digital infrastructure Digital delivery Assessment focus Accessibility
Student preparation for tertiary studies in a digital environment (4.3.2)	Secondary School preparation Digital learning preparation	Impact on learning Learning Management system Independent learning Student transition Navigation Digital learning Positive experience
Confidence for digital learning (4.3.3)	Access to learning opportunities Access to digital resources	Digital exposure BYOD Non-school experience Digital literacy Digital resources

Themes	Sub-themes	Index
Student learning preferences (4.3.4)	Student learning Educator approach	Knowledge Convenience Priorities 21^{st} century students Learning styles Educator perspectives

4.3.1 UG Student: Supporting the development of student digital confidence through digital responsiveness

The first theme to be discussed that emerged from the data for this participant group is supporting the development of student digital confidence through digital responsiveness. This theme is characterised by factors that are external to UG students that can impact their ability to develop their digital confidence. These factors include the orientation to the DLE and the available digital infrastructure to support the learning. The key features of this theme were the structures that the education system has in place to support UG students to develop their digital confidence and included both the NZ Curriculum and the availability of digital resources. The experience at secondary school for this participant group varied, ranging from UG students who had very limited digital experience [UGS.42] to UG students for whom the development of digital skills, knowledge and strategies was essential to the roles they held at secondary school [UGS.46].

4.3.1.1 Curriculum delivery

The structure of the degree programmes UG students were enrolled in was not always congruent with their expectations. The data revealed that some UG students preferred to use digital technology, as opposed to books, to complete research for assessments, but that they preferred to be able to handwrite their assessments, as they had done during their secondary schooling [UGS.49]. While this particular student [UGS.49] had a high level of confidence with digital technology on entry to tertiary studies they thought there would be more "*text book*" related work at tertiary level and not as much reliance on digital technology. This was echoed by another UG student who similarly explained that

> *…. [for] processing information I require old school textbooks, lectures and face-to-face communication to learn [UGS.51]*

For one UG student who had progressed immediately from secondary school into the degree programme BYOD had been introduced at their secondary school in their final year of schooling. They expressed a high level of confidence using digital technology but they did not like digitally focused learning as it involved too much time spent "*staring at a screen*"

[UGS.55]. Another UG student who enjoyed the DLE opinioned that there has to be a balance between digital and face-to-face learning [UGS.3]. Although this UG student did not "*think there was anything wrong with online learning*" as they enjoyed the availability of the degree digital learning resources, they also acknowledged the increased availability of digital resources to enable all students to be able to have access to textbooks [UGS.3]. This student also believed that there is a need for face-to-face in class learning as it provides the opportunity to hear other people's perspectives. In terms of the way the degree programme is structured there were UG students who

> *Thought there would be more time in class and more time with the lecturers. I thought there would be more writing and activities during class [UGS.2]*

There remains, in the data, a preference for paper-based resources and face-to-face learning. One UG student acknowledged that they expected learning in the degree programme to occur digitally, and the amount of digital technology was what they expected. They recognised that digital learning provides ease of access to learning resources but the lack of physical resources meant they do not like digital learning [UGS.13]. One UG student shared, for example, that *"you do not learn much behind a computer screen"* [UGS.21] and because they preferred face-to-face they perceived that they did not get "*questions explained relative to my learning style and learning needs*". This student participated in her secondary schools optional BYOD policy and had a high level of confidence entering the degree, but nevertheless found the LMS and the tertiary institution's student internet "*quite difficult to navigate*". There were a number of digital skills that this student needed to develop to be able to be successful in the digital environment.

4.3.1.2 Digital orientation

In cases where programme staff provided digital orientation for them in the first week of the programme, UG students found this helped them to navigate their degree programmes' digital environment [UGS.42; UGS.60]. They also expressed that because an introduction to the DLE occurred during programme orientation, the secondary schooling

BYOD programme did "*not really*" have a positive impact on their progression into tertiary studies as

> *.. I knew how to use a computer and if I didn't have prior knowledge [institution name withheld] provided a computer class during orientation [UGS.48]*

This comment of the secondary school BYOD not having a positive impact is not congruent with other UG students' perspectives of the policy. For instance, UG students with a high level of confidence using digital technology for learning attributed this confidence to the amount of digital work they completed at secondary school and that they were also experienced in using a LMS. One UG student found the navigation of the LMS "*easy to understand*", but it was not clear whether this ease was influenced by the digital orientation sessions. The importance of the orientation of UG students to the digital environment is captured by a UG student who had progressed directly into tertiary studies from secondary school. They had a high level of confidence using digital technology for learning prior to entering the degree programme. However, in response to the question of how easy the degree programme digital environment is to navigate they acknowledged that

> *I do need to be initially taught the navigation of the online environment. But easy after that [UGS.3]*

At secondary school this student was exposed to digitally focused learning through their English and History classes, in the use of Microsoft tools and undertaking online research. However, another UG student who progressed immediately from secondary school to tertiary studies admitted not liking anything about digital learning, as they

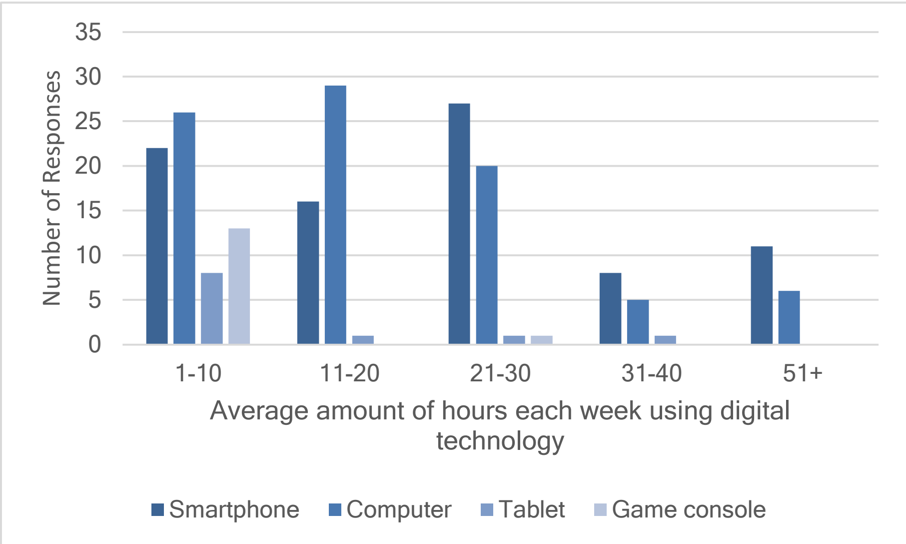
> *….have not use[d] a lot of technology for learning before and at times can be very overwhelming and [I] need to have support [UGS.10]*

This student perceived that there was not enough time allocated for orientation to the digital learning platforms. This student also did not expect that there would be a lot of the learning to occur using digital technology although they did recognise that there is a need to embrace digital technology "*as it is the way of the future*" [UGS.10].

For this student there was more digital technology in the degree programme than expected. Their view of study at tertiary level was focused on not being allowed to ask questions of the teacher. They perceived that "*we spend too much time with* [digital] *technology*" [UGS.10]. This student's average weekly digital technology use was greater than the average participant usage. The self-disclosed weekly average time spent on digital technology for this participant group is shown in Figure 4.10. The most preferred devices for this participant group were smartphones and computers/laptops with an average time each week of 25.99 hours and 18.67 hours respectively.

Figure 4.10.

UG Student Average Weekly Digital Technology Use (N=84)



4.3.1.3 Assessment focused

UG students reported that the main use of digital technology during their schooling was for assessment submissions and there were limited opportunities to participate in digital learning at school. One UG student enrolled in a secondary school that had a BYOD policy mentioned that they were not allowed to access computers during class time. They mostly used the computers at secondary school for undertaking research for assessments:

In secondary school, we used computers to complete online assessments and used Microsoft word for essay writing [UGS.1]

Another UG student who enjoyed the DLE in the degree programme found it useful for assessment completions, because

…we can find everything what [sic] we need online. We can find useful websites for our assessments [UGS.41]

The focus on using the Internet for assessments was supported by 21.7% of UG students who completed the TSSQ and the comments were consistent across the participant group regarding this topic. For a number of UG students this included not only completing of assessments and locating of digital resources but also digital submissions [UGS.43; UGS.47; UGS.48]. One UG student who was very confident using digital technology for learning prior to entering tertiary studies attributed this confidence to having

… used technology all through high school years completing assignments and doing various tests online [UGS.44]

Utilising of digital technology for learning during secondary school was seen as useful to the UG students' tertiary studies as

I knew from year 12 how to search databases which has helped and enabled me with my tertiary studies in terms of my research/assignments etc [UGS.46]

However, one UG student recognised that although they had utilised digital technology for "*research based assignments*" at secondary school, they were not confident utilising digital technology for learning on entry to their tertiary studies [UGS.51]. At secondary schools which had a BYOD policy in place, they had utilised online plagiarism software, submitted online assessments, and completed assessment research online. They identified that the assessment focus at secondary school had had a positive impact on their first year of tertiary studies. However, in terms of their overall digital learning experience, while recognising digital learning is "*very convenient*" and "*you can get it anytime and anywhere"*, they did not find digital technology

…useful for taking notes as I believe it cannot be processed in your mind [UGS.51]

While acknowledging tertiary studies would include using digital technology for learning for this student there was more digital technology at tertiary level than they expected.

In this theme, which focused on supporting the development of student digital confidence, the sub-themes of curriculum and digital resources emerged from the data. The feedback collected from UG students revealed that digital orientation, digital infrastructure and accessibility were important factors in this theme. In terms of digital delivery as a component of the curriculum sub-theme the secondary school focus of using digital technology to meet assessment requirements also featured strongly in the data.

4.3.2 UG Student: Student preparation for UG studies in a digital environment

The second theme that emerged from the data for this participant group is student preparation for UG studies in a digital environment. The UG students identified the need to have the opportunity to develop their ability to participate in digital learning opportunities throughout their experiences in the NZ education system. They acknowledge both the importance of digital exposure during their secondary schooling and access to digital learning opportunities that will support their progression out of secondary school and into their UG study pathways. The features of this theme considered their secondary school preparation and their tertiary experience at the time of data collection. UG students were asked to consider their expectations of digitally focused learning at tertiary level and if, at university, they expected a lot of learning to occur using digital technology. The majority of UG students in this study (79%) responded they did expect a lot of learning using digital technology in the degree programme.

There was a strong acknowledgment in the data of UG students' expectation that digital learning would occur at tertiary level. However there were also UG students who did not feel prepared for the level of digital technology utilised to support their learning experience. One UG student thought, for example,

…that there would be lecturer and online resources but I thought that you would be able to re-watch lecturer online. I also didn't expect there to be as much learning online, I thought there would only be readings/resources online [UGS.44]

This was not an isolated perspective. Another UG student thought that while they would be using laptops in the classroom and have access to digital resources, assessments would still be paper-based [UGS.57]. However, in turned out that there was a greater use of digital technology than expected:

There was more online learning than I expected. I wish I had more experience using the online learning platforms as it would have made uni less stressful [UGS.2]

More technology than I expected. I wish we didn't use it so much [UGS.3]

The data further revealed that one UG student "*didn't really have any expectations, I just knew the workload would be intense*" [UGS.70] while another UG student perceived that university study was "*really going to be hard*" [UGS.41]. When asked if there was as much more digital technology than expected in tertiary study fifty eight UG students (72.5%) responded with 'yes' to this question .

Even UG students whose expectations of digital technology use were met still acknowledged university would be hard work [UGS.52], although one UG student shared it was "*not as bad as I thought*" [UGS.48]. This student reported spending up to 120 hours per week on digital devices and being confident using technology. During secondary schooling they had developed a number of digital skills and attended a school with a BYOD policy. They acknowledged the positive impact of this policy on their learning experience as they learn better by typing.

For other UG students, there was more digital technology in use than expected:

A lot more self directed learning than at school with a lot larger classes. Much more independence in your learning [UGS.4]

For some UG students there was a realisation of the limited level of their digital abilities:

Prior to my tertiary education I thought I knew most but later found that I really didn't know much and had to learn [UGS.5]

While one UG student indicated that tertiary study would be "*more independent and hands on than college"* [UGS.19], another expressed the view that there would be

A lot of self-autonomy, independence, time management, focus as there is no teacher growling you [UGS.21]

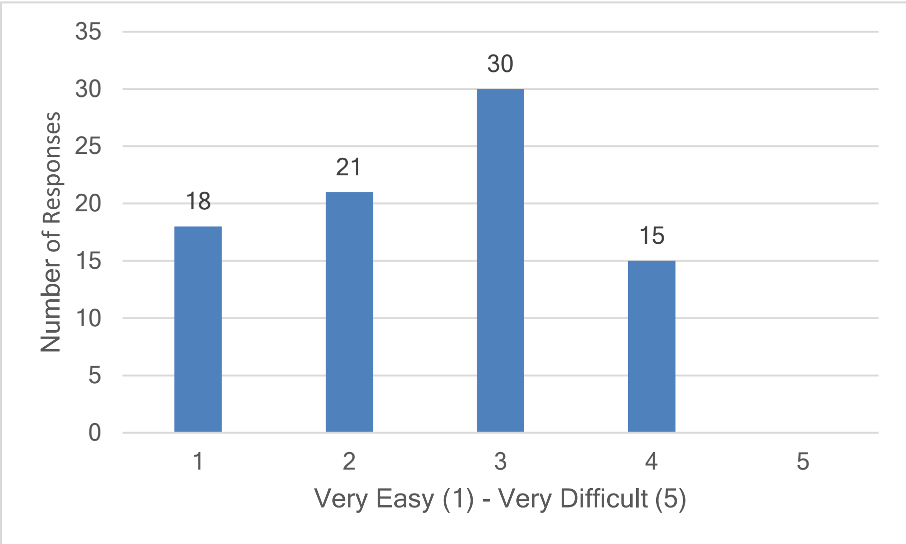
4.3.2.1 Digital learning preparation

The use of the Internet for learning at secondary school was also reflected in the data. UG students reported that they were provided with the opportunity in their secondary schooling to use digital technology in the classroom. Their experiences were varied and ranged from UG students completing assessment related work to accessing teacher provided resources for their individual classes [UGS.43; UGS.51]. One UG student pointed out that these class resources were not always provided by their teacher and that they were required to locate their own digital resources to support their learning. Digital research skills were identified as a skill UG students acquired at secondary school, and this skill was found useful for their first year of the chosen degree programme [UGS.24, UGS.43]. However there were UG students who reported that they had limited exposure to digital learning at school, often limited to the experience of *"just typing up assignments*" [UGS.2].

There were instances where the UG students reported that they were underprepared [UGS.43] and that they did not have the opportunity to access class resources digitally, or complete digital assessments. For one UG student exposure to digital technology was limited to using social media and emails to stay in touch with their peers [UGS.42]. While there were some instances where UG students perceived that secondary school did not prepare them effectively, this was not reflective of the majority of UG students in this study. Although UG students identified that there were a number of digital skills they needed to develop to be able to successfully participate at UG level, overall UG students reported that they were prepared for tertiary studies. Using a 5 point Likert scale across the five points of (1) very ease, (2)ease, (3) neutral level of ease, (4) slightly difficult and (5) very difficult UG students were asked how easy did they find their degree programme's digital environment to navigate. Eighty four UG students answered this question and 82% of the respondents described their level of ease at a score of 3 or higher, this is, that is, neutral to very easy (Figure 4.11). No UG student found the digital environment very difficult to navigate.

Figure 4.11.

UG Student Ease of Digital Environment Navigation (N=84)



This ease of navigation was related to UG students' experience in secondary school. UG students generally knew their way around the technology:

> *I found it quite easy to navigate the online environment because of my previous experience at secondary school* [UGS.41]
>
> *At high school using the internet for learning was very strong [UGS.27]*
>
> *We used technology for completing online assessments, online quizzes, research projects and online class resources [UGS.44]*

One UG student who had already used Moodle© at secondary school did not feel there would be much for them to learn to be able to successfully participate in the digital learning components of their degree programme [UGS.44]. They entered the degree programme with a high level of confidence in their ability to utilise digital technology for the purpose of learning. As they used technology in secondary school *"all the time"* and were taught how to navigate technology for the purpose of learning, this had a positive impact on their digital confidence. BYOD was important in the development of their digital confidence as it

> *…got me prepared for doing more online based work and taught me valuable skills in relation to technology [UGS.44]*

For this particular student [UGS.44], there was nothing that they did not like about digital learning as it was their preferred mode of learning.

Some UG students, however, encountered digital challenges when they progressed from secondary to tertiary study:

> *I know the basics to do most tasks but have to seek help for little specific things [UGS.78]*

This need to seek help was also related to the lack of standardisation in the layout of digital resources and the challenges this creates when navigating the resources [UGS.52; UGS.59]. A degree of unfamiliarity was also evident in UG students' use of Moodle:

> *Moodle was slightly confusing at first as I was well adapted to my high school portal [UGS.29]*
>
> *Not too sure using Moodle and intranet to find timetables and assignments but otherwise its easy to find class resources and independent learning [UGS.61]*

One UG student who had not had any education in high school in the use of digital technology for learning reported that they self-taught their digital skills during an extended gap period of seven years between leaving secondary school and entering tertiary studies. Even with this lack of a formal educational experience in digital technology they were still confident in navigating the digital environment [UGS.42]. This aspect of self-teaching digital knowledge and skill development was also evident in another UG student's response:

> *I struggled initially because it was new and unfamiliar and I hadn't use an online site for school work. However it gets easier and I had the skills to*

figure it out from social media and using my phone looking up stuff online [UGS.2]

In the progression from secondary school to tertiary level there were some UG students who identified a lack of access to digital technology in their secondary schooling:

I had completed my secondary schooling and were not allowed to use any kind of technology [UGS.20]

It was all book work with one or two computer classes a week [UGS.26]

The UG student experience in the preparation for digital learning was varied and ranged the entire continuum from being prepared for a digital future to having no opportunities or experiences of digital delivery.

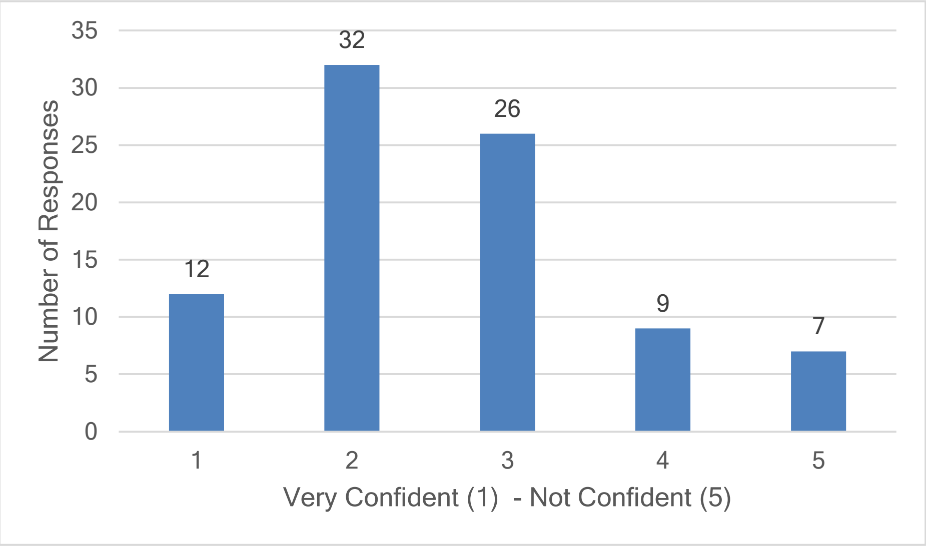
UG students indicated that their preparation for tertiary studies was influenced by digital learning opportunities that occurred during their secondary schooling. There is evidence in the data of a positive experience when UG students progressed into tertiary study. Participants reported that this experience was influenced by the impact of secondary school digital learning experiences on their progression into tertiary studies. In the data these factors were described by the UG students including their confidence with the LMS to be able to undertake independent learning.

4.3.3 UG Student: Confidence for digital learning

The third theme to be discussed for this participant group is confidence for digital learning. The data identifies this confidence is related to the level of digital exposure UG students have experienced. There is also their social engagement with digital technology that they attribute to the development of their digital confidence. The UG students acknowledge that their ability to successfully participate in digital learning experiences is strongly influenced by their level of digital confidence. This theme encompasses the aspects from the UG student experience that are influenced by their access to learning opportunities and digital resources. Using a 5 point Likert scale across the five points of (1) very confident, (2) confident, (3) neutral level of confidence, (4) slightly not confident (5) not confident UG students were asked to describe their confidence using digital technology prior to entering their tertiary studies. Eighty six UG students answered to this question and 82% of the respondents rated their confidence at a score of 3 or higher, that is, neutral to very confident (Figure 4.12).

Figure 4.12.

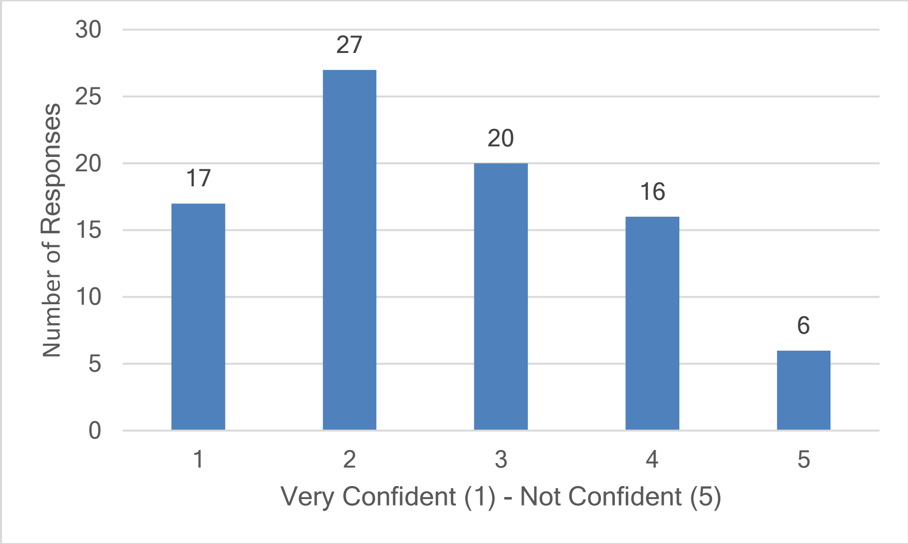
UG Student Digital Technology Confidence Prior to Entering Tertiary Studies (N=86)



Using the same 5 point Likert scaling UG students were then asked to describe their confidence using the Internet for the specific purpose of learning prior to entering their tertiary studies. Eighty four UG students answered this question and 73% of the respondents rated their confidence in using the Internet for learning at a score of 3 or higher, that is, neutral to very confident (Figure 4.13).

Figure 4.13.

UG Student Digital Learning Confidence for the Specific Purpose of Learning (N=86)



There is a slight difference between UG student perceptions of their technology and digital learning confidence and their confidence using digital technology prior to entering their tertiary studies, which is slightly higher. One UG student who indicated that their digital learning confidence was lower than their technology confidence explained that

> *…we didn't do much digital learning at school – just typing up assignments. Confident though with social media so I just figured I would understand* [UGS.2]

This UG student had not immediately progressed from secondary school into tertiary studies and had a 3 year gap in their education journey. However their experience was not an isolated one and the acknowledgment of the development of digital skills and knowledge occurring outside of their secondary schooling was similar to UG students who had progressed directly to tertiary studies from secondary school. This was attributed to the development of digital confidence occurring in the workplace [UGS.70; UGS.16], and through social media use [UGS.47]. However, confidence using digital technology did not always result in a corresponding confidence for digital learning. One UG student who had a high level of digital confidence prior to entering tertiary studies acknowledged upon entering tertiary education that

> *…prior to my tertiary education I thought I knew a lot [about technology] but later I found that I really didn't know that much and had to learn [UGS.5]*

For UG students who had had a significant gap in their progression from secondary school to tertiary study, there was an acknowledgement of the need for further digital skill development for the purpose of learning, despite their digital confidence on entry to tertiary studies. For example, one UG student confided that

> *I was very confident using technology but not as confident finding appropriate info for learning [UGS.13]*

Another UG student similarly acknowledged that when they entered UG study they had a

> *…pretty basic technology and internet skills such as the use of emails, internet surfing, Google searches, etc. However I have had to learn how to use online classrooms, academic research, online tests, etc once I began tertiary study* [UGS.45]

UG students who had a high level of confidence with both technology and digital learning found it easy to navigate the digital environment because of either their digital experience at secondary school or the amount of time they spent using technology. However, one UG student who completed Yr13 biology in 2008 answered 'very confident' (1 on the Likert scale) to both questions but attributed this confidence to the fact that they spent an estimated 67.5 hours per week using digital technology, primarily a smartphone and a laptop [UGS.58]. While this student completed Yr13 in 2008, they had utilised digital technology for learning at secondary school for "*accessing resources, online tests and Microsoft*". For example, the student stated that

> *I spend a lot of time (maybe too much) on technology. Also, I've use the internet as a tool/resource since high school so I'm pretty comfortable with it [UGS.58]*

Another UG student attributed their confidence levels to being

…born when technology was coming in so I have use it all the time at school [UGS.6]

The notion of confidence being related to digital exposure from a very young age was also reflected in the following UG students' responses:

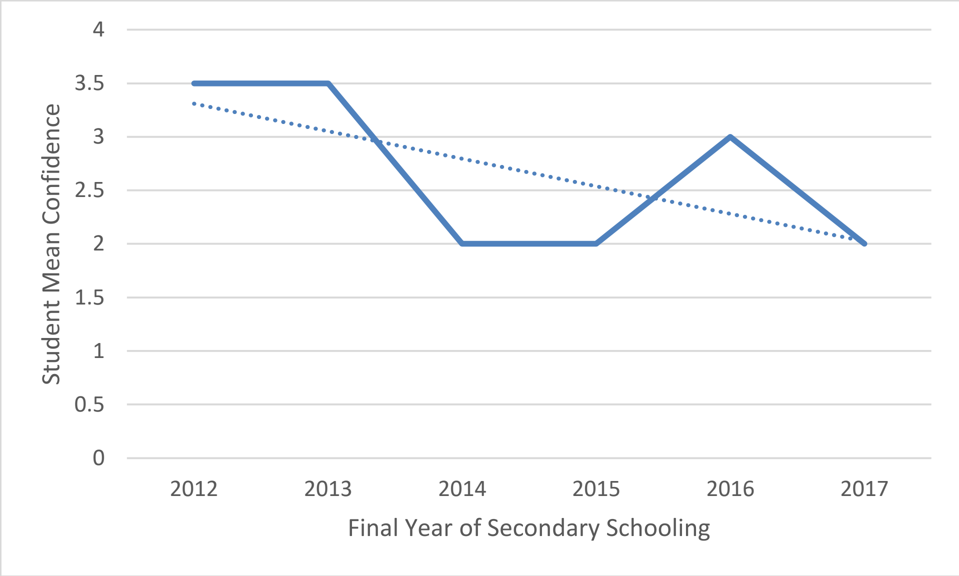
I guess I've grown up around and in the culture where everyone uses a computer [UGS.3] and

Have had previous exposure to technology, growing up around it and needing it to get through high school [UGS.18]

However, irrespective of the length of time between the completion of Yr13 biology and the entry to tertiary study the data showed that digital confidence across the entire participant group was high and was improving. Students who had completed Yr13 biology during the years 2012 to 2017 were all confident using the Internet for learning, and their level of digital confidence prior to commencing tertiary study during this time had been improving. The 5 point Likert scale was used to measure this change and a score of 5 was considered not confident while a score of 1 denoted very confident. For UG students who completed their secondary schooling in 2012 the median confidence level was 3.5 and had improved by 1.5 points to a median of 2.0 for digital learning confidence prior to UG studies in 2017 (Figure 4.14).

Figure 4.14.

UG Student Digital Learning Confidence Prior to UG Study, 2012-2017 (N=69)



4.3.3.1 Access to digital learning opportunities

UG students were then asked if, during their secondary schooling, their schools had a policy in place to enable UG students to take their own devices to school for the purpose of learning. While thirty seven out of 87 UG students (43%) responded ‘yes’ to this question, 50 (57%) responded ‘no’.

UG students who were able to take their own device to school found having access to a device at home and school was helpful to their learning [UGS.3; UGS.25]. UG students attributed their ability to use devices for learning in their UG studies to their digital exposure at secondary school [UGS.18; UGS.23]. For one UG student, the BYOD policy at their school had a positive impact on their first year of UG study as

> *I use my devices every day and for every lecture/assignment. If I hadn’t been exposed to technology like I was [at secondary school] I would most likely struggle [UGS.18]*

Access to a personal digital device at school also positively impacted on the learning experience as this

Allow[s] me to work online at school and home as well as avoiding school computers [UGS.43]

One UG student entered tertiary studies with a high level of confidence with digital technology on admission to their chosen degree programme of studies as their secondary school had a BYOD policy and a requirement to purchase a device. Although this student had exposure to digitally focused learning tools they did not feel their school's BYOD policy had a positive impact on their studies. Their experience was that their devices were not used in class as often as they expected. They also found they had navigation difficulties with the LMS and intranet at their tertiary institution [UGS.6].

The lack of exposure to digitally focused learning opportunities was also evident for another UG student who described their BYOD experience at school as negative as they only used their device for typing their assessments [UGS.55]. In terms of BYOD and access one UG student perceived there was not enough access to the Internet at school and that the internet was "*not affordable for everyone – high cost" [UGS.60],* which was also a reason why they did not like digital learning.

Another UG student perceived the BYOD policy at their secondary school did not have a positive impact on their preparation for UG studies as the tertiary institution would provide them with digital support.

I knew how to work a computer and if I didn't have prior knowledge [tertiary institution] provided a computer class during orientation [UGS.48]

The majority of UG students (57%) in this research reported that they did not have a BYOD policy at school and one UG student shared that

I had completed my secondary schooling and the school did not allow [us] to use any kind of technology [UGS.20]

Despite having had no access to technology in their secondary schooling this particular student did report a high level of confidence with both technology and using the Internet for learning prior to entering the degree programme. They attributed this confidence to being "*tech savy [sic]*" and that they had become familiar with new technology by "*playing around* *with it*" [UGS.20]. For another UG student the lack of access to digital devices at secondary school had a positive impact on their studies as there were "*less distractions"* [UGS.65]. One UG student highlighted that their lecturers should

> *Keep in mind that some students may not have easy access to technology as others do, so maybe ensuring that there's an alternative [for online learning] [UGS.*]*

UG student participants shared that the theme of confidence for digital learning was characterised by their access to both learning opportunities and the digital resources to enable these opportunities to be meaningful to their learning journey. Participants reported that factors related to digital exposure through BYOD and digital experiences outside of the classroom were important to the development of their confidence for digital learning.

4.3.4 UG Student: Student Learning Preferences

The fourth and final theme that emerged from the data for the UG student participant group was student learner preferences. This theme is characterised by the UG students' preferred learning style and the mode of teaching delivery. There are challenges evident in this theme regarding the UG students' perceptions of the impact of their UG lecturers on their ability to participate in digital learning opportunities. This includes aspects of the UG student experience that were influenced by the educator approach as well as their own learning preferences. UG students had a range of perspectives regarding learning preferences. For example, from an environmental perspective, one UG student perceived that digital learning would result in reducing paper waste [UGS.42]. In terms of digital delivery, there is a view expressed in the data that there needs to be a balance between digital and traditional delivery methods. This was described as providing an environment where there is a balance between digital and face-to-face classes as the "*in class learning allows for discussion and other peoples opinions*" [UGS.3].

4.3.4.1 Convenience of the digital platforms

This view of a need for balance between digital and face-to-face learning was fully supported in the data. For example, a number of UG students indicated that they prefer a face-to-face, rather than a digital, mode of delivery. UG students who progressed from secondary schooling to tertiary studies without an interruption stated that the reasons for this included the requirement of "*old school textbooks and face-to-face communication to learn*" [UGS.51]. The preference for face-to-face communication was also expressed by a UG student who "*would rather have face to face. I still handwrite notes*" [UGS.16]. There was also the acknowledgement from one UG student that their learning occurs through "*visual and hearing people talk about it so [I] prefer in-class learning*" [UGS.18]. The lack of physicality of not attending class is also captured by two UG students who perceived they

> *…do not get questions explained relative to my learning style and learning needs. You do not learn much behind a computer screen [UGS.21]*
>
> *…can't approach lecturers in person to ask questions [UGS.58]*

This lack of physicality in the class space was described by one UG student as

> *Miss[ing] having class discussion and sharing ideas of other[s]. Having a teacher to ask questions. Feel like you are behind/alone/struggling [UGS.62]*

Although not being able to approach a lecturer in person was not seen as an issue by all UG students and being able to communicate via email was viewed as a positive factor of digital learning. However, there was one UG student who liked nothing about the DLE and often felt overwhelmed [UGS.16]. While this student claimed to have a high level of confidence in using digital technology for the purpose of learning, they still found navigating the digital environment challenging due to the unfamiliar layout of the LMS when they first entered the degree. Their experience was that

> *There were so many sections [on the LMS] to go through to get where you need to be [UGS.16]*

UG students who expressed a positive view of the DLE generally enjoyed the independence that the DLE provides and being able to remain up-to-date with class content when unable to attend class:

> *All of the powerpoints are accessbile at any time for assignment writing or if I can't make a lecturer [UGS.47]*

Being able to access class resources in the digital space was viewed as positive [UGS.52; UGS.53]. This included the ability to be able to work at their own pace, remain up-to-date with classes and access class resources from home when unable to attend class. For one UG student digital learning enabled her to discover her learning style [UGS.61]. Digital learning provided UG students with the opportunity to

> *…do it at home if unwell and need to catch up on work [UGS.30]*

This convenience of digital learning was identified by a number of UG students, and they appreciated being able to

> *Do it in your own time and always having access to it, I like that there is always a digital copy to refer to which minimises paper [UGS.44]*

In terms of convenience of access one UG student did acknowledge that access from home required an internet connection, which incurred a cost and meant access outside of their tertiary institution was limited [UGS.70].

While one UG student expected to use digital technology for learning, there was more digital technology use than they expected. From their perspective they

> *…wish[ed] we didn't use it so much! I am only 18 and I can see what type of people we are becoming, Zombies on our phones" [UGS.23]*

While there is a continuum of learning preferences present in the data for this participant group, there is also recognition that UG students inherently know how to utilise digital technology for learning due to being born and growing up in the digital era. For one UG student who had a high level of confidence in the digital environment, completed their secondary schooling with a BYOD policy and had their own digital device, this meant that they

> *…have been taught in school how to use the internet… We have grown up around and in a culture where everyone uses a computer [UGS.3]*

However, for this student there was also a recognition that there needs to be a balance between digital learning and face-to-face classes. This student believed that face-to-face classes need to occur to enable discussions and the sharing of ideas. The view of belonging to a culture that is defined by the ability to utilise digital technology was a perspective that was also shared:

> *I was born when technology was coming in so I used it all the time at school [UGS.6]*

While this student preferred to learn with hard copies of class resources, the idea that this generation would be successful in the DLE was further expanded upon by this student who believed that "*older generations will struggle*" [UGS.6] in the DLE. However this perspective is not reflected in the data and for UG students in this study who completed Yr13 biology prior to 2011, before the first BYOD policy was introduced, their confidence utilising digital technology for learning prior to enrolment in their degree programme was slightly higher when compared to the wider participant group.

4.3.4.2 Digital learning challenges

UG students indicated that there was a difference in their confidence levels between using digital technology for everyday use and for the purpose of learning [UGS.13]. For some, this was linked to the utilisation of social media confidence to support their digital learning [UGS.2]. Other UG students shared that they experienced difficulties managing their LMS independent learning as they were easily distracted by commitments outside of their education experience. UG students have commitments outside of their education provider that impact on their ability to participate in independent learning, and have a decreased interest in independent learning if it is not compulsory. UG students found that there are times when "*it is hard to make time for it"* [UGS.69] and "*sometimes you forget about it. I find it hard to stay focused*" [UGS.61].

Not all UG students enjoyed digital learning and recognised that there are challenges that impact on their ability to engage with the digital learning experience. One UG student acknowledged that what they did not like about digital learning was the distractions that their device offered and that there were times when they found the internet more interesting than their learning activities:

Sometimes we get distracted while learning online because it has got so many things which are interesting enough to get distracted [UGS.41]

This distraction to digital learning was supported by another UG student, who, due to their preferred learning style and the preference for in-class learning, found digital technology a distraction to their learning [UGS.18]. This view was also shared by another UG student who preferred using digital technology for entertainment rather than completing the digital learning activities [UGS.12]. However, digital distractions were not always viewed as negative, and for one UG student the impact of distractions resulting from the use digital devices for entertainment was counterbalanced by their high degree of confidence using digital technology for learning [UGS.47]. These distractions also occurred when UG students

…don't always do it [digital learning]. Lack of motivation when no one says you have to do it [UGS.48]

There is also the situation where students need to be reminded to engage with the digital platforms [UGS.52]. It is acknowledged in the data that digital learning is "*totally up to the individual*" and there is the potential to be "*slack*" [UGS.65].

4.3.4.3 Educator approach

The digital confidence of their tertiary lecturers can also present challenges to UG student learning experiences. Learning independently and being able to prepare for class using digital technology was viewed as a positive aspect of digital learning. However it was acknowledged that with this independence there were concerns when UG students did not understand the digital content, as they found it *"harder to get clarified"* [UGS.8]. While UG students did expect learning to occur via a digital platform, there is an indication in the data that they wanted a greater lecturer presence especially in relation to assessment completions [UGS.22; UGS.27]. UG students indicated that they need their lecturers to be able to provide guidance to enable an effective digital learning experience, with one UG student acknowledging that

As longs as the tutors are well equip[]ped] with how to use the online technology, I think most students would be ok to [UGS.55]

UG student participants have expressed, from their experience, that when there are issues with technology in the classroom lecturers do not seem to be able to find a solution to prevent interruption to the learning experience. For example, one UG student reported that

> *Often lecturers are equally if not more confused when there is a[n] issue [UGS.69]*

The theme of UG student learning preferences was concerned with the factors that influenced their personal learning styles and the perspectives and digital competencies of their teachers and lecturers. UG students shared that they believed there are generation characteristics that place them at an advantage in the digital environment when compared to their teachers and lecturers. They sometimes viewed the impact of this as UG lecturers being unable to provide them with the support they needed to succeed as digital leaners. There is also the acknowledgement in the data of the challenges prioritising learning using digital devices due to the accessibility of these devices.

4.3.5 UG Student: Summary of findings

The analysis of the data for TSSQ for the UG students presented in this section led to the emergence of four main themes: (1) Student confidence for digital learning; (2) Student preparation for tertiary studies; (3) Student learning preferences and (4) Supporting the development of student digital confidence through digital responsiveness (Table 4.3). Emerging sub-themes were access to digital learning opportunities, access to digital resources (Theme 1), secondary school preparation, digital learning preparation (Theme 2), curriculum, digital resources (Theme 3), student learning, and educator approach (Theme 4). As with the Yr13 participant group, the data analysis of the TSSQ captured the UG experiences of whether their participation in, confidence with, utilisation of digital literacy skills and knowledge in their secondary school had an impact on their UG digital learning experiences. They had shared their perceptions of their digital preparation in secondary school and the challenges they had experienced in the development of confidence, knowledge and digital literacy skills to enable them to participate in the digital expectations of tertiary study.

The third participant group in this study was the UG lecturer and the results of the analysis of the data collected from this participant group are discussed in the next section.

4.4 UG Lecturer Results

This section presents the findings which address the fourth and final research questions of this study, namely:

4. What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?
5. What do health science UG lecturers require to support students for the DLE in UG study?

Using the principles of thematic framework analysis as discussed in the previous chapter (Section 3.5) four main themes emerged from the UG lecturer AFG data: (1) supporting the development of student digital confidence through digital responsiveness (2) student preparation for tertiary studies in a DLE, (3) availability of digital learning opportunities, and (4) preparedness of educators to support student in the DLE. Two of the themes, namely, (1) supporting the development of student digital confidence and (2) student preparation for tertiary studies in the DLE, were the same for the Yr13 biology students and the UG student participant group in response to the research questions. As explained in Section 4.3 of this chapter it was anticipated that there would be similarities between the three groups of participants. Furthermore, the purpose of the AFG was to capture UG lecturer’s reflections on their perceptions of the level of preparedness for digitally focused learning Yr13 students are exposed to during their secondary schooling, while drawing on their experience of working with UG students from the health science disciple area in the DLE. Emerging sub-themes from the UG lecturer data were curriculum, digital (Theme 1), student learning, student progression (Theme 2), delivery access to digital learning opportunities, impact of digital literacy (Theme 3), UG lecturer digital literacy, professional development opportunities (Theme 4).

The data presented in this section is based on the feedback received from seven UG lecturers who teach in the first year UG programmes, and who participated in the AFG. The alignment of the research questions, themes, sub-themes and index categories is summarised in Table 4.4. Following the summary presented in Table 4.4 the findings for this participant group are reported in Section 4.4.1 to Section 4.4.4 respectively.

Table 4.4

UG Lecturer: Relationship Between Research Questions 4 and 5, Themes, Sub-themes and Index Categories

Themes	Sub-themes	Index
Research question 4: What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?		
Supporting the development of student digital confidence through digital responsiveness (4.4.1)	Curriculum Digital delivery	Digital technology Student centered Digital delivery
Student preparation for tertiary studies in a digital environment (4.4.2)	Student learning Student progression	Skills, knowledge & strategies Educator perspectives Digital interaction Self-directed learning Assessment focused Priorities
Availability of digital learning opportunities (4.4.3)	Access to digital learning opportunities Impact of Digital literacy	Digital Exposure BYOD Digital Literacy
Research question 5: What do health science UG lecturers require to support students for the DLE in UG study?		
Preparedness of educators to support student digital confidence (4.4.3)	Educator digital literacy Professional development opportunities	Formal and informal Improved opportunities Student support Skills, knowledge and strategies

The first three themes to be discussed that emerged from the UG lecturer data, (1) supporting the development of student digital confidence through digital responsiveness student access to digital learning, (2) student preparation for tertiary studies, and (3) availability of digital learning opportunities, are in response to research question 4: *What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?*

4.4.1 UG Lecturer: Supporting the development of student digital confidence through digital responsiveness

The first theme that emerged from the UG lecturer data was the need to support the development of student digital confidence. For students to be prepared to confidently participate in digitally focused education they need to have exposure to a digitally focused mode of teaching and learning. To ensure the development of student digital confidence is supported by the education system the mode of teaching needs to be student-centred with a curriculum document that is both digitally inclusive and digitally responsive. UG lecturers acknowledged that in terms of supporting the development of students to be able to confidently participate in the DLE there needs to be an awareness of a fast moving digital environment and the need to be digitally responsive. Digitally literate students need to have the skills, strategies and knowledge to adapt with digital technology as it evolves. Students need to demonstrate confidence so they can navigate across all types of digital technology. This includes being able to solve problems. One UG lecturer expressed this as follows:

> *I do have a concern in relation to how meaningful it would be in an environment that can change literally overnight with the upgrade of a software version or the release of a new app that replaces everything already taught and learnt. This takes me in my thinking to what might the content look like and how do we keep it meaningful and relevant in a fast digitally evolving and changing environment? [UGL.7]*

Being cognisant of and responsive to this evolving DLE was viewed by one UG lecturer as

…require[ing] big investment in terms of time, equipment and education. The potential of really being able to use the technology and platforms available is enormous and would certainly go a long way to make course delivery more student centered [UGL.3]

There is also the view that the "*use of [digital] devices in the classroom contributes effectively to students learning*" [UGL.6] by exposing UG students to new digital tools and/or programmes. UG students have provided feedback to the UG lecturers

…regarding how these systems whilst challenging to use initially, become easy to understand and certainly assist in enhancing their [identifier omitted] knowledge [UGL.6]

While the UG lecturers are able to appreciate the value of the DLE the analysis revealed a number of factors that influenced the ability of students to participate in digital learning. The factors included: digital delivery and student preferences.

4.4.1.1 Digital delivery

Undergraduate lecturers acknowledged the strengths of digital education and delivery. It provided a method of communication with students and also enabled students to be able to work collaboratively and share information with their peers and their lecturers. Undergraduate lecturers see digital education as providing the opportunity for students to develop their relationships with their peers by using digital technologies to encourage participation in the classroom. For one UG lecturer, providing digital learning opportunities meant

Rethinking how we interact with students so that we are able to be more responsive and exploit teaching opportunities through different mediums and in a more timely way [UGL.3]

It was reported that the mode of digital delivery enabled students to have ready access to information as course resources were available to them through the learning management system. This enabled students to keep up-to-date with course timetables during periods of absence and provided students with the resources required for assessments. One UG lecturer's view of digital education was

> *A seamless ability for students and staff to work in and use the digital environment, using it for its maximum potential and as a 'force multiplier' for when it came to student outcomes [UGL.2]*

This UG lecturer explained that force multiplier was a term commonly used in the NZ military and was

> *The ability to accomplish greater things than without it. So, being digitally literate in an educational realm would enhance a students or an organisations ability to achieve their aims [UGL.2]*

A description that was acknowledged by fellow UG lecturers as capturing the importance of a digitally focused education experience. The aim of the Curriculum is for students to be on a pathway to becoming digital citizens and UG lecturers shared that a process needs to be in place in education to encourage increased participation in providing opportunities for digital participation for students. UG lecturers proposed that this could occur through

> *A wide yet not complex range of blended carefully linked digital activities for students to engage with, would support the various learning styles of each individual. This might help maximize learning engagement and outcomes [UGL.7]*

UG lecturers acknowledged this breadth of student experience, and that they

> *...would like to see a lot more interactive PowerPoints & tutorials during which we show students how to access information & participate in joint learning exercise they get to navigate around their iPhones, iPads, laptops etc [UGL.1]*

> *…to enhance [digital learning] within the [name withheld] degree processes need to be in place that encourage increased digital engagement from students [UGL.7]*

This UG lecturer perceived that the implementation of such a process would enable the

…support of individual skills levels, help increase knowledge surrounding the positive benefits of digital engagement, along with supporting positive attitudes that increases motivation in blended curriculum activities [UGL.7]

They also deemed it important that students are encouraged to use their digital devices in class sessions to support students in the development of their digital skills. There was an acknowledgement in the UG lecturers' contributions of a need to:

Rethink how we interact with students so that we are able to be more responsive and exploit teaching opportunities through different mediums and in a more timely way … [and] encourage students to work from their devices – tablet/phone/laptop throughout the classes… [UGL.3]

This UG lecturer also believed that

…[there] may be a barrier for some students that are not comfortable with technology [UGL.3]

The same UG lecturer [UGL.3] had put in place a teaching strategy where for every new student cohort they allocated class time for working through digital resources with students to build their confidence in the tertiary DLE. Another UG lecturer explained this as

…role modelling by the lecturer [which] can play a part in developing digital literacy in the classroom…this can be achieved by demonstration, encouragement and creating an expectation [students will engage in digital learning] [UGL.7]

One UG lecturer mentioned:

Students will definitely need reasonably high-speed internet connectivity because data-density is ever-increasing. To engage in-the-moment students' devices & connections need to have high-speed connection [UGL.1]

4.4.1.2 Curriculum

Undergraduate lecturers acknowledged that students need support and orientation to become familiar with the LMS, and this change in pedagogy is acknowledged by one UG lecturer who shared that

> *…students must be guided to manage the change from a more traditional face-to-face delivery of education [UGL.6]*

This UG lecturer identified that

> *…we as educators must create opportunities where more education is given regarding the use of Moodle…to ensure that students are more confident in using Moodle [UGL.6]*

While this UG lecturer is asking for more opportunity to teach students about the digital tools that are utilised in UG programmes, UG lecturers also recognised that today

> *We are living in the digital era. Technology is a part of everyday life. Schools and organisations now use all different levels, types, ways of integrating digital technology and …with the digitalisation within the school system, everything is instant so people expect as much [UGL.3]*

This UG lecturer described this "*instant*" factor as an issue because it fails to take into account that it "*takes time*" for students to develop the skills required to be successful in the digital environment. There was a view that DLEs require that educators

> *…need to get beyond thinking just in terms of digital devices, laptops, iPads, iPhones, computer and look at other digital forms of learning [UGL.1]*

This UG lecturer believed that by engaging in "*beyond thinking"* educators will be able to help students "*develop capability in digital discovery learning*". In terms of curriculum development to support the development of student confidence one UG lecturer proposed that

> *Conceptualising digital literacy into our curriculum would mean a big investment in terms of time, equipment and education [UGL.3]*

Regarding the theme of curriculum, UG lecturers identified both the impact of the curriculum and digital delivery in the DLE as supporting the development of student digital confidence. UG lecturers identified that by strategically introducing digital delivery into the UG student learning experience they maintain a student centred focused learning environment. In this setting there is a need for educators to be able to effectively manage the DLE to ensure they are able to provide appropriate, meaningful digital learning experiences for UG students.

4.4.2 UG Lecturer: Student preparation for UG studies in a digital environment

The second theme that emerged from the data for the UG lecturer participant group was student preparation for UG studies in a digital environment. This theme includes factors that are related to UG student learning. For secondary school students who are transitioning to tertiary studies, there is an expectation from the UG lecturers in this study that students are entering UG study prepared for the digital learning requirements. That they possess a level of digital skills, knowledge and strategies for the digital expectations of their chosen programme of study. Student preparation for tertiary level studies was a concern for all the UG lecturers who participated in this study. They all identified advantages of integrating digital learning in their teaching which included students being able to participate in self-directed/independent learning and having the opportunity to complete a course at a pace which works best for them. The inclusion of self-directed/independent learning course components provides students with the opportunity to have greater control over their learning experiences by supporting them to self-manage their participation in the learning experience. To have an improved learning experience UG lecturers indicated that they would like students to enter tertiary education with the "*skills to operate independently, competently and confidently in the digital environment*" [UGL.2]. They expressed the view that

> *Students will certainly require a level of digital literacy coming into a [UG] programme and we probably should now view this as a core entry pre-requisite as numeracy and literacy currently are [UGL.6]*

For UG lecturers, digitally focused learning is primarily organised as independent learning activities, learning that occurs outside of the classroom that supports the face-to-face teaching sessions. There were concerns for all UG lecturers regarding the students' ability to remain focused and participate in digitally focused independent learning. Undergraduate lecturers have had their students talk with them about their difficulties in self-regulating their learning due to the distractions of their extra-curricular activities and their level of preparedness for independent learning. One UG lecturer remarked that a student had shared that during their secondary schooling there had been

> *No preparation for self-regulated e-learning and was unprepared for the whole concept of it when [they] entered tertiary education. [They] said that the volume of the work expected to be absorbed via e-learning was daunting [UGL.2]*

In response to this student experience there was an acknowledgment from UG lecturers of the importance of the role of the theory of self-regulation in the learning process and the positive impact of this theory to student outcomes. The ability to self-regulate is seen, by UG lecturers, as a pre-requisite for the tertiary setting as students need to be able to navigate the digital environment and direct their own learning with less guidance than what is provided at secondary school. As the self-regulation of learning is deemed as a pre-requisite for tertiary level students, UG lecturers place the responsibility of teaching students the process of self-regulation in the secondary school curriculum. They suggested that if students are provided clear guidance on how to plan their learning experience to achieve their outcomes, students would be prepared for digital learning expectations in the tertiary sector.

4.4.2.1 Factors impacting on digital learning

Undergraduate lecturers observed the level of distraction digital devices provide for students and that they must be supported to move their focus from social digital engagement to engaging with the devices for the purpose of learning. They offered a range of perspectives on this issue and the importance of a digital literacy development. For example, one UG lecturer commented that

> *Digital literacy requires them to get past the distractions of the internet and focus long enough to complete tasks / research / or assessments online [UGL.4]*

The distractions provided by digital devices were also acknowledged by UG students, who have shared with their lecturers their challenges in managing the DLE. The difficulties for students who have progressed from secondary school into UG studies is related to the expectation by all UG lecturers in this study that students will self-regulate their learning.

> *Some of the school leavers have said they find it difficult to self-regulate their own learning as they are easily distracted by other commitments [UGL.3]*
>
> *They must be guided to adapt from a social perspective of online engagement and in addition be prepared to engage in a more professional manner with others [UGL.6]*

The need to self-regulate and take ownership for their learning was identified by UGL.1 who stated

> *Year 13 students need to be prepared for the discipline & 40 hours/week engagement required. They need to learn how to prioritise and manage their study time in order to keep up & not be surprised & overwhelmed by the amount of self-application required.*

This expectation is also shared by UGL.7. The level of preparedness for UG studies expected by the UG lecturers extends to the UG students' professional manner and includes UG students understanding that "*Siri and Google are for their home lives*" [UGL.1]. This UG lecturer also perceived that secondary schools have a responsibility to better prepare students to be able to access and participate in the DLE on entry to UG study. This responsibility was also acknowledged by UGL.2 and UGL.3. The students' ability to make the adaption from engaging with the social aspect of digital devices was also acknowledged by this UG lecturer who perceived that

> *Students of today are generally very adept at social media collaboration, we as [registered professionals] must ensure that students are skilled at, and prepared for online collaboration in a professional manner [UGL.6]*

However, UG lecturers also indicated that to be successful in the tertiary sector students must be provided with guidance to assist them to prioritise their learning and

> *Manage the change from a more traditional face-to-face delivery of education to a significant increase in the expectation and self-management related to self-directed learning [UGL.6]*

To manage this change the UG lecturers recognised that UG students need to develop their ability to be independent and undertake the necessary self-directed learning in the DLE. The UG lecturers shared that this involves students communicating, investigating and presenting in the digital space. UG students are described as needing

> *…the skills to operate independently, competently and confidently in the digital environment [UGL.2]*
>
> *…the ability to independently apply skills and comprehend information within the digital environment, across all levels of technology [UGL.3]*

The view that digital literacy includes an independent component at UG level is evident in the data. For one UG lecturer

> *….the theory of self-regulation works well in theory, and if applied correctly would set secondary students up well for the tertiary sector [UGL.3]*

However, there is acknowledgement, for this UG lecturer group, that students do not meet the independent learning requirements in the DLE. UG students have shared with the UG lecturers the main reasons for this are related to their "*non-curricular work*" [UGL.1] and students are unable to extend themselves any further. Students have also shared that digital access has been an issue as well. Undergraduate lecturers also provided feedback that they have been advised by students that their challenges are

> *Some of the school leavers have said they find it difficult to self-regulate their own learning as they are easily distracted by other commitments [UGL.3]*

…motivation played a big part in relation to coping with self-regulated e-learning / being successful [UGL.7]

Irrespective of the reasons, the lack of engagement with the DLE is evident with poor engagement statistics with the learning management system.

4.4.2.2 Student transition to the UG DLE

The factors that impact on a Yr13 student's progression from secondary school into UG study includes the student's ability to participate in the learning environment. With regard to this progression of Yr13 students into the tertiary sector UG lecturers perceived Yr13 students need greater preparation for the expectations of UG study. There was a view that Yr13 students needed to have knowledge of the

…various platforms, programmes and systems that are in place to support the digital learning environment [UGL.3]

Overall, the UG lecturers in this study observed that not all UG students were comfortable with the DLE which was as a barrier to their participation and interaction with the "*digital interface*" [UGL.3] and the achieving of their learning outcomes. One UG lecturer observed that

Some students think they have a competent grasp of the digital environment because they online game or can use a word processor programme. However, although this may give them some insight, it wouldn't be enough to prepare them adequately for the tertiary learning area [UGL.3]

However it was identified in the data that being able to use digital software that they are familiar with is not the same as feeling confident across all digital software they are expected to engage with as part of their learning experiences. To be able to participate in the DLE requires support on how to use digital technology for the purpose of learning at UG level. Yr13 is viewed, by the UG lecturers, as the time to teach students how to use the DLE for the purpose of learning. A lack of preparation of Yr13 students for this level of participation was captured as follows:

Year13 students need to be prepared for the discipline required. They need to learn how to prioritise and manage their study time in order to keep up & not be surprised & overwhelmed by the amount of self-application required [UGL.1]

I would encourage year 13 students (while they are still at school) to get into good study habits in regards to self-directed and independent learning. Start to develop problem solving skills and communication skills will help you interact with others digitally [UGL.3]

There was also the acknowledgement that students need to be supported as they progress from secondary school into their UG study DLE. It was recognised in the data by the UG lecturers that students need to be guided to manage the change from, what they view as a, predominantly face-to-face delivery to a significant increase in learning being delivered through a DLE [UGL.6]. For the UG lecturers the DLE requires students to self-manage and participate in independent, self-directed learning opportunities. They see it as important that

…the ability to self-regulate learning is a pre-requisite in the tertiary setting, students need to be able to navigate the environment and direct their own learning with less guidance than in high school [UGL.3]

For UG lecturers directed, self-directed and independent learning were terms that were used to capture the DLE of their respective programmes and it was perceived that the secondary school sector needed to provide secondary school students with greater opportunity to engage in a DLE to better prepare them for UG study. For one UG lecturer this meant that

Perhaps if DL [directed learning] was part of the school curriculum, the school level achieved could be matched with a tertiary course expectation, making it [digital learning requirements at tertiary level] potentially less of a surprise for everyone [Yr13 students] [UGL.7]

Working with secondary schools to facilitate a smoother transition of Yr13 students into UG studies was supported by the following UG lecturer who identified that

> *We as educators could potentially engage with year 13 students whilst still at school with a "mock" version of Moodle to enable them to explore this platform prior to leaving school [UGL.6]*

Another UG lecturer suggested that utilising a scaffolding approach between secondary school and the tertiary sector would provide the opportunity to "….*shape and help regulate expectations and requirements within the digital realm*" [UGL.7]. For this UG lecturer this would

> *Mak[e] it [student transition pathways] much more of a transparent process in relation to what has been taught / learnt, qualifications gained, any gaps in skills /knowledge and relevant skills required etc. An example of this might be that future [tertiary provider] courses shape themselves around school leavers acquired DL skills and knowledge [UGL.7]*

Regarding the theme of student transition to the UG DLE, UG lecturers indicated that UG students are unprepared for the self-directed, independent learning activities that occur via the DLE. The distractions of digital devices contributed to this unpreparedness as did the lack of Yr13 student preparedness for the DLE expectations of UG studies. There is recognition of the need for the tertiary sector to work more closely with secondary schools to address the Yr13 student and UG lecturers' concerns regarding putting in place a plan to support student transition into the UG DLE.

4.4.3 UG Lecturer: Availability of digital learning opportunities

The third theme that emerged from the data for the UG lecturer participant group was availability of digital learning opportunities. In the data it is acknowledged that students need to have access to digital learning opportunities so they can develop their digital literacy skills. This theme recognises that without a level of digital exposure in the education setting students will be unable to develop their digital confidence and achieve their learning goals. For the UG lecturers in this study this includes aspects of the UG student experience that they perceived were influenced by the access to digital learning opportunities as well as the opportunity to develop digital literacy skills. In developing student confidence for a DLE all

UG lecturers who participated in this study agreed that being able to engage with and access digital technology is important. They acknowledged that

> *In the digital driven world we are in, to not have that ability will leave you at a disadvantage. So much information is available, from so many sources, it would be wrong to not let an individual have an ability to use them and access them [UGL.2]*
>
> *In the world students live in and in societies of the future the need for a level of competency in digital literacy will become much more important as a means of effective communication and engagement [UGL.5]*

Having the ability to engage and communicate with digital technology was attributed to the need for students to be able to demonstrate confidence through digital literacy. Digital literacy was described by this participant group as involving a range of skills, knowledge and strategies to be able to access digital technology to enable participation in the DLE. For one UG lecturer [UGL.1] this included

> *…having the skills to access required knowledge using forms of digital technology, and …[the] need to learn how to be discerning about the Internet sites they use to support their learning & what information is truthful and trustworthy*

It was recognised in the data that digital literacy was important for students to be able to confidently access the DLE and participate in their UG studies. For students who were unable to participate in digital learning opportunities, it was acknowledged this situation created stress for students. There was the acknowledgment that students were being disadvantaged in their learning and the *"inability to use many forms of digital media is already a significant [disadvantage] and stressor*" [UGL.3]. This level of stress and disadvantage for students was also attributed to the inability to effectively utilise digital technologies for the purpose of learning. The ability of students to access the DLE was a concern for the UG lecturer group. They acknowledged that without digital literacy the impact on students was much greater than the ability to engage in education, it impacted on their ability to participate in everyday activities, as

> *Digital literacy will be an essential part of many parts of life that we take for granted, from the way we shop to what life long learning will look like. Digital literacy will become an integral part of the lives of us all [UGL.5]*

There was also an acknowledgement in the data of the risk of digital disengagement as for some students their inability to utilise digital technology had an impact on their ability to participate in learning using a digital interface. UG lecturers recognised that to ensure all students had equitable access to the DLE students would need to be provided with orientation in how to navigate their digital devices for the purpose of learning, as

> *…some students […] are not comfortable with technology, and at this stage the only way we can assume students are not comfortable with this, is by limited participation and interaction with the digital interface [UGL.3]*

The UG lecturers believed that providing students with an understanding of how digital technology will be used in their UG studies will result in students demonstrating a "*seamless ability to …. work in and use the digital environment*" [UGL.2] for the specific purpose of learning. The need to be able to engage with the DLE as to be digitally literate was viewed, by one UG lecturer, as a factor that

> *…will be an essential part of many parts of life that we take for granted …. an integral part of the lives of us all [UGL.5]*
>
> *Just as you would expect a child to be able to read or to use a pen, I would also expect that people are taught digital literacy as a core life skill [UGL.4].*

One UG lecturer viewed digital literacy as a tool to promote "lifelong learning" [UGL.3] for students to be able to find, evaluate and critique the many forms of digital information. Due to the importance that is placed on the need to be able to participate in the digital environment UG lecturers expressed the view that digital literacy needs to be included as a core subject in the secondary school curriculum and "*taught alongside numeracy and literacy as a foundational subject*"[UGL.5]. There was also a concern that as

> *[Digital literacy] will be essential for the overall wellbeing of our society that the population understands and becomes digitally literate. There are currently massive sociological consequences in our New Zealand society as a result of the lack of basic numeracy & literacy [UGL.1]*

The importance of being able to participate in a DLE was attributed by one UG lecturer to the fact that "*digital delivery seemed to take over and everything in the classroom was digitally focused*" [UGL.2] and that students need to have the skills, knowledge and strategies to be able to confidently and competently engage with digital technology. The requirement to be able to use digital technology in a manner that creates time efficiencies [UGL.4] and the ability for students to be able to adapt the different types of technology to support their learning needs is also a consideration in the availability of digital learning opportunities as the DLE is constantly evolving. The acknowledgement of this rapidly changing environment was also noted by another UG lecturer who expressed

> *…a concern in relation to how meaningful it would be in an environment that can change literally overnight with the upgrade of a software version or the release of a new app that replaces everything already taught and learnt. This takes me in my thinking to what might the content look like and how do we keep it meaningful and relevant in a fast digitally evolving and changing environment? [UGL.7]*

All UG lecturers in this study largely agreed that digital literacy primarily involves the demonstration of skills and knowledge and that it needs to be "*taught alongside literacy and numeracy*" [UGL.3]. There is a recognition of the link between confidence and digital literacy where digital literacy is viewed as a "*broad term for the level of confidence …. to access information*" [UGL.3]. However, one UG lecturer described the development of digital literacy as

> *…more than just the step-by-step process of completing an activity or transaction, it's about understanding the language involved and having appreciation of how electronic data is accessed, stored and retrieved,*

knowledge of how to navigate the way around a digital platform in order to be able to complete a given or required activity [UGL.3]

Part of the ability to confidently participate in the digital environment is also related to access to the digital devices. This access was acknowledged by all UG lecturers as important in their ability to ensure there is digital exposure for students. For one UG lecturer this meant that

…there would be a need for the student to own a devices as a pre-requisite for the [UG degree] [UGL.6]

However, the same UG lecturer also recognised that inequity may be an issue as not all students are able to have access to a digital device [UGL.6]. Social exclusion was viewed to be an issue by one UG lecturer who perceived that there was a risk students would be socially excluded if they were unable to acquire the required level of digital competency required *"in the timeframes within a subject curriculum*" [UGL.7]. The concern of social exclusion and the risk of the educational and socioeconomic outcomes divide widening was also identified by another UG lecturer who believed

If education is going to demand greater digital literacy in the future, there is potential for the divide in educational and socioeconomic outcomes to widen. It is vital that those less able to or motivated to actively participate in the current education system have easy access to education that is inclusive and relevant to their needs [UGL.1]

The issue of social exclusion and the increasing divide between education and socio-economic outcomes, as expressed by UG lecturers, was related to how students were accessing education and the acknowledgement that students being able to access a DLE would support face-to-face teaching sessions. This was captured by a UG lecturer who acknowledged that the

…improvement of access whereby students can be given information and access to discussions remotely which would mean face to face time could be more [professionally] focussed [UGL.4]

Regarding the theme of availability of digital learning opportunities, UG lecturers identified the impact of digital literacy on the ability of UG students to access digital learning opportunities. All UG lecturers indicated that digital literacy should be a foundational subject as UG students are expected to participate confidently in the DLE. There is recognition of the risk that the divide in educational and socioeconomic outcomes may widen if digital equity concerns are not effectively addressed. These equity concerns may have an impact on the preparation of students for tertiary studies.

4.4.4 UG Lecturer: Preparedness of educators to support students in the DLE

The fourth and final theme to be discussed that emerged from the UG lecturer data, preparedness of educators to support students in the DLE, is in response to research question 5: *What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?*

A key feature of this theme was the need for improved digitally focused professional development opportunities to enable educators to provide students with appropriate digital support. It was acknowledged in the data for this theme that educator digital skills, knowledge and strategies are not always at the level required to enable educators to support students in the DLE. This includes aspects of the educator digital confidence to utilise digital technology while encouraging student participation in the digital environment. Overall the UG lecturers in this study identified that they require greater support to meet students' digital needs. For one UG lecturer this meant that

> *Both students and lecturers need help to develop capability in digital discovery learning & teaching…. I would like to be exposed to some of these things [software and programmes] in order to know how I could potentially utilise them to support much deeper student learning & critical thinking [UGL.1]*

The need to be able to support student learning is also recognised by another UG lecturer who said

I also don't understand the digital language that well and that is another barrier to trying to get to grips with something new when even the how to guide is difficult to understand [UGL.3]

While expected to implement the digital requirements of the curriculum delivery UG lecturers indicated that their digital knowledge and confidence requires further development opportunities. One UG lecturer stated, for example,

I feel confident with what I know now, in order to use the resources that I commonly need to utilise, but that isn't the same as feeling confident to embrace the vast array of digital technology that is out there and could have potential benefit to my teaching practice [UGL.3]

The analysis revealed that overall UG lecturers felt underprepared to deliver digital learning opportunities for students.

4.4.4.1 Educator digital literacy

UG lecturers were cognisant of the potential digital technology offers to education in terms of flexible learning options, and the "*driving"* [UGL.1; UGL.3] of learning experiences. There was also an awareness by UG lecturers of the need to upskill [UGL.3] in the digital environment to be able to demonstrate to students the skills required to be able to successfully navigate this environment. There was a view from UG lecturers that they need to develop their digital ability and that

…educators/lecturers need to become experts in the digital environment to provide students/learners with appropriate guidance and learning experiences [UGL.3]

For this UG lecturer, the development of their level of digital ability to be prepared to teach in a DLE has been through their own experiences in the DLE:

The professional development I have undertaken to help raise my confidence level is being a student myself… This helped me to understand how the students may feel in regards to some of the platforms they use. If not set up well, the online environment can be a difficult learning *environment. I have a lot more learning to do in this area. Other skills I have learnt, I have picked up from completing post grad study and trial and error methods [UGL.3.]*

My knowledge has been gathered in a pretty haphazard way and generally on the fly so this is a bit of a barrier to trying to convey knowledge to students. I guess my strengths come from knowing the resources available for students who are struggling and being able to point them in the right direction if and when they encounter problems [UGL.7]

However while there was no indication in the data of what being an expert in the DLE would look like, there was also the acknowledgement that

I am very aware that many students are far more competent than me when it comes to navigating the web so I would not consider myself capable of extending students digital literacy beyond my own basic level [UGL.7]

It is evident from the data that UG lecturers are engaging students' digital knowledge to assist with the challenges that occur when there are technology issues in the classroom students will readily assist:

I will engage the support of the students in class if issues arise with technology as in my experience they are very adept at solving digital technology issues! [UGL.6]

With the digital expectations of curriculums across the NZ education sector, UG lecturers expressed concerns regarding their own professional capabilities relating to digital skills and knowledge. UG lecturers' concerns include their confidence to teach in the DLE. One UG lecturer commented:

As I read this [AFG contributions] it makes me reflect on how much more my own digital literacy skills need to be improved and how much wider I need to be thinking about utilising different teaching & learning/ discovery options. Because I have such limited skills I don't even know what is available or how I could be using these different options [UGL.1]

There is a view by UG lecturers that students have a higher level of digital competence in web navigation than their lecturers. UG lecturers recognised that to support student learning they need to be able to confidently demonstrate the digital skills and use digital technologies during the teaching and learning process. To develop this level of confidence they acknowledged that they require access to digitally focused professional development opportunities.

4.4.4.2 Professional development opportunities to support educator preparedness to teach in the DLE

The way professional development opportunities occur was not driven by the tertiary organisation where the UG lecturers were employed. Five of the UG lecturers in this study developed their digital literacy skills through their own experiences as postgraduate students in the DLE, while the remaining two UG lecturers developed their digital knowledge through their own ongoing education. One UG lecturer indicated that there was no real support or opportunities for professional development to develop digital literacy skills [UGL.7]. Their view was that the employer expected that they would have the skills. To develop their digital literacy UG lecturers indicated that they

> *…would like support to understand how I could become more digitally literate and capable of effectively utilising the incredible power of digital discovery learning [UGL.1]*

For this UG lecturer, developing digital competency was limited to

> *….learning on the fly and somewhat serendipitously. I still need students to come up and help me manage unexpected glitches on the class computer when I am trying to open files or search for & show videos. I think it gives some students a quiet sense of satisfaction seeing an old fossil struggling with what is so simple to them [UGL.1]*

Another UG lecturer attributed their level of digital literacy to the impact of the birth cohort:

> *I guess I can only answer this from my current level of experience or non-experience in most cases. As an educator who is also participating in online*

learning, I am aware of the potential that edtech can offer in terms of driving learning and flexibility. However, I feel tech is a whole different language and while I feel that I can adapt as I learn, to be able to create an inclusive learning environment in a non-physical space is going to take much more learning and understanding on my part. In a nutshell, we would need to assess digital literacy levels, undergo further education and training and be provided with mentorship. That would be for required the older generations [UGL.3]

A view that is supported by another UG lecturer who also indicated they are confident with the software that they ordinarily use in their teaching, but when a change of software is required their confidence levels decrease:

> *…that isn't the same as feeling confident to embrace the vast array of digital technology that is out there and could have potential benefit to my teaching practice [UGL.3]*

All UG lecturers acknowledged that their digital literacy skills need to be improved and that they would like more support to improve their digital literacy and their capability to utilise digital technology in their teaching. When participating in digitally focused learning opportunities their focus is on what they need to know in this present moment. One UG lecturer described this as follows:

> *I have been mostly taught/shown by others doing a similar role so I have picked up on what they know and hybridised it to suit my needs. I have attended in-service sessions on new programmes and systems that have been introduced e.g. [tertiary provider software] & Moodle but with a focus on what I need to know right now to get the job done rather than exploring new functions that could be incorporated into my overall tool kit. Generally I don't understand half of the information anyway. I recognize that I am also not drawn to technology in my personal life like some people are so probably*

slower to increase my uptake of more social and recreational digital technology than some [UGL.3]

Several UG lecturers expressed the view that they would need upskilling to be able to fully utilise digital technologies to enhance learning opportunities.

I feel confident with what I know now, in order to use the resources that I commonly need to utilise, but that isn't the same as feeling confident to embrace the vast array of digital technology that is out there and could have potential benefit to my teaching practice. Again I think it stems from my previous learning style of 'need- to- know -and-put -to- use- immediately' that means I have gaps in my knowledge. I also don't understand the digital language that well and that is another barrier to trying to get to grips with something new when even the how to guide is difficult to understand. Limited professional development exposure to use of digital technology since I have been an educator [UGL.3]

The lack of focused professional development opportunities has an impact on the development of the digital skills of educators for the DLE. Consequently, if educators do not have the skills to manage this environment, this may have an impact on their ability to manage the DLE. Regarding this theme, UG lecturers identified both the impact of their level of digital competence to utilise digital technology while encouraging student participation in the DLE. There is an acknowledgement of the paucity of professional development opportunities provided by their tertiary institutions and the need for greater investment in the development of their confidence in the DLE. They identified that their digital skills, and digital confidence, have been acquired primarily through their own opportunities and their experience as distance students.

4.4.5 UG Lecturer: Summary of findings

The analysis of the data obtained from the UG lecturer AFG discussed in this section revealed the emergence of four main themes: (1) Supporting the development of student digital confidence through digital responsiveness; (2) Student preparation for UG study in a

DLE; (3) Availability of digital learning opportunities and (4) Preparedness of educators to support students in the DLE (Table 4.4). Emerging sub-themes were curriculum, digital delivery (Theme 1), student learning, student transition (Theme 2), access to digital learning opportunities, impact of digital literacy (Theme 3), and educator digital literacy, professional development opportunities (Theme 4).

The data analysis captured the UG lecturer experiences of UG student participation in, confidence with, utilisation of digital literacy skills and knowledge. They shared their perceptions of the digital preparation of Yr13 students for the UG post-school pathways, while reflecting on their own digital journey including the development of their confidence, knowledge and digital literacy skills to participate in the DLE.

4.5 Chapter Summary

This chapter presented the thematic analysis of the qualitative data that related to the research questions which were restated in Section 4.1.1. Section 4.2 identified the main themes that emerged from the Yr13 Biology Student Survey questionnaires, Yr13 Biology Student Post Survey questionnaire and the online activity logs from an OLR. In Section 4.3 the data analysis from the First Year Tertiary Study Survey questionnaire was presented. Section 4.4 presented the data analysis from the UG lecturer AFG.

Six overall themes emerged across the Yr13 and UG student and UG lecturer data. These themes are: (1) Supporting the development of student digital confidence through digital responsiveness; (2) Student preparation for tertiary studies in a digital environment; (3) Confidence for digital learning; (4) Student learning preferences; (5) Availability of digital learning opportunities and (6) Preparedness of educators to support student digital confidence in the DLE. As explained in Section 4.3 the same four main themes emerged from the data for Yr13 biology students emerged and the data for UG student participant group in response to the research questions, namely, supporting the development of student digital confidence through digital responsiveness, student preparation for tertiary studies, confidence for digital learning, and student learning preferences and student preparation for tertiary studies in a DLE. Using a case study research strategy it was expected there would be strong similarities between the main themes that emerged from the data between these two groups of participants as 41% of the UG students' participants had progressed from secondary school into UG studies within six months of finishing their Yr13 secondary schooling year at the time of data collection. Furthermore, the questions in the Yr13 student questionnaires and the TSSQ supported a comparison of the experiences of the two participant groups during data analysis (Section 3.4.3 in Chapter 3).

For the UG lecturer data, two of the themes were the same for the Yr13 biology students and the UG student participant group in response to the research questions, namely, supporting the development of student digital confidence through digital responsiveness and student preparation for tertiary studies. Due to the focus of this research being the progression of Yr13 biology students into the tertiary sector it was anticipated that there would be similarities between the themes for the three groups of participants. This was primarily due to the purpose of the AFG which aimed to capture UG lecturers' reflections on their perceptions of the level of preparedness for digitally focused learning Yr13 students are exposed to during their secondary schooling, while drawing on their experience of working with UG students in the DLE. The six themes and sub-themes that emerged from the analyses for each participant group are summarised below in Table 4.5. The significance and implications of these findings, including the commonalities and impactful differences, and the intersection of themes, will be discussed in the next chapter.

Table 4.5

Themes and Sub-themes

Themes	Sub-themes Yr13 Students	Sub-themes UG Students	Sub-themes UG Lecturers
Supporting the development of student digital confidence through digital responsiveness (4.2.1, 4.3.1, 4.4.1)	Student digital preferences Teacher support for digital confidence	Student access to digital learning opportunities Curriculum	Digital resources Digital delivery
Student preparation for tertiary studies in a digital environment (4.2.2, 4.3.2, 4.4.2)	Transition pathways Uncertainty Digital learning challenges Student priorities Digital distractions	Secondary School preparation Digital learning preparation	Student preparation Student progression
Confidence for digital learning (4.2.3, 4.3.3)	Access to digital learning opportunities Access to digital resources		
Student learning preferences (4.2.4, 4.3.4)	Student knowledge and skill development Student learning	Student learning Educator approach	
Availability of digital learning opportunities (4.4.3)			Access to digital learning opportunities Impact of Digital literacy
Preparedness of educators to support student digital confidence (4.4.4)			Educator digital literacy Professional development opportunities

Chapter 5 Discussion

Introduction

This chapter discusses the findings associated with the research questions presented at the outset of this thesis (Section 1.3 in Chapter 1). As discussed in the previous chapters, an instrumental case study design research strategy (Silverman, 2017) was employed to enable the researcher to explore, and appreciate the relationships in the data between the three participant groups, namely, Yr13 students; first year UG students, and UG lecturers, in this study. These results are considered in light of the implications, findings and intersection of the themes from the analysis presented in Chapter 4. This chapter is divided into six sections and utilises the data for the participant questionnaires and the AFG to discuss the significance of the overall themes and sub-themes in relation to the rationale for this study, the current literature, and the research questions.

5.1 Supporting the Development of Student Digital Confidence Through Digital Responsiveness

The first theme that emerged from the data analysis is the support the New Zealand (NZ) education system provides to develop student digital confidence through digital responsiveness. The data gathered from the Yr13 student Yr13Q and Yr13PQ, the UG student TSSQ questionnaires and the educator AFG contributed to this theme (see discussion in Chapter 4, Section 4.2.1 [Yr13 Student], Section 4.3.1 [UG Student], and Section 4.4.1 [UG Lecturer] results respectively). Student digital preferences and teacher support of digital confidence development occurs through the design of the curriculum. A digitally delivered curriculum that includes well developed digital resources enables students to access digital learning opportunities.

5.1.1 Student access to digital learning opportunities

The theme of supporting the development of student digital confidence through digital responsiveness is an important feature of this research. The experience of students being supported by their teachers to develop their digital confidence was varied. Passey et al. (2018) claimed that digital skills are crucial to digital confidence development and if students are not supported to develop their digital skills, knowledge and strategies it has an impact on their ability to develop their digital confidence. Access to digital learning opportunities to enable students to learn how to use digital technology efficiently is essential. UG lecturers in the current study acknowledged that this includes being able to respond to a rapidly evolving digital environment. In this study there were students who expressed concern that digital delivery was not the priority of their respective schools. For a group of students their digital exposure occurred in their social environment (see Chapter 4, Section 4.2.1). Students need digital exposure in the education systems to enable effective digital confidence development. This development enables students to take control of their digital environments and enables greater levels of participation in their transition into UG studies (Passey et al., 2018).

Students today are expected to utilise digital technology and the internet to participate in digital learning opportunities. The quality of school digital infrastructure was also identified as an issue by the Yr13 students. These issues included: the internet was unreliable and slow to respond, digital resources unable to open and, for one student, internet access at home [Yr13S.10] (see Chapter 4, Section 4.2.1). These issues impact on student digital confidence, as evident in current literature. For example, Callo and Yazon (2020), identify digital connectivity is an issue that impacts on student learning opportunities. Tsitsia et al. (2020) further discuss the cost of the internet and internet connectivity as challenges experienced by students who were participating in digital learning. Furthermore, Tsitsia et al. (2020) identified that the majority of students in their study faced infrastructure issues during digital learning. Cost of the internet was recognised as both an issue and a barrier to digital learning by a UG student [UGS.60] in this study (see Chapter 4, Section 4.3.1.1). Passey et al. (2018) noted that education needs to provide the opportunity for students to develop their digital confidence. Nonetheless, while recommendations could be made to education providers to improve the digital infrastructure available to students, in most instances this is outside of the secondary schools' and tertiary providers' locus of control. In NZ the Government is addressing the connectivity issue and has an initiative in place to improve the network of all schools in NZ (MoE, 2021).

5.1.2 Digital delivery

UG lecturers acknowledged the strengths of digital education, in that it provides students with the opportunity to work collaboratively, have ready access to information, share information with their peers and their teachers. They proposed the development of a curriculum that is responsive to both student needs and the emerging digital technologies. Erstad and Voogt (2018) agree curriculums needs to reflect the competencies and knowledge required for the 21st century and be designed to be supported with digital technologies. The UG lecturers in the present study further proposed that this curriculum would need include the concepts of digital citizenship, digital literacy and a complex range of digitally blended activities to encourage digital participation (see Chapter 4, Section 4.4.1.1). There is also the recognition by the UG lecturers that the “conceptualisation of digital literacy in to our curriculum” [UGL.3] would require investment. Drake and Reid (2020) suggest education needs to invest in developing 21st century students who are able to fully participate in a digitally focused society. From this study it is evident that education in NZ needs to urgently reconsider the commitment to promoting a DLE to ensure the NZ education remains in line with global developments. It is concerning that the majority of Yr13 students who participated in this study reported having only a minimal amount of in class digitally focussed lessons. Their most predominant type of digital learning experiences was for the purpose of assessment completions.

5.1.3 Teacher support of digital confidence

A concern expressed by the students in this study was the expectation from their teachers that they intuitively know how to utilise digital technology to meet their learning needs (see discussion in Section 5.2.2). This view is supported in the literature. Howard et al. (2016), for example, further identified that there is an expectation from teachers that students are confident and engaged in the digital environment. Yr13 students shared that their digital skills were largely self-taught and that they were expected to independently problem solve digital issues as they occurred. Yr13 students sometimes felt unsupported by their teachers as they attempted to navigate new and unfamiliar digital learning opportunities. Coldwell-Neilson (2018) similarly showed that significant assumptions are made, by academics, about students' digital abilities because of their birth cohort. In this research this assumption is untrue for the Yr13 students and in the data it is evident that students' digital abilities are both varied and context dependent. However, the UG students had a different perspective. They viewed their birth cohort as an advantage in their UG studies. They acknowledged that in school, through BYOD policies, they were provided with digital learning opportunities and as a result were confident and prepared for UG studies (see Chapter 4, Section 4.3.1.1).

There was a group of students who expressed uncertainty about their ability to navigate digital learning and who needed support in the classroom to be able to fully participate in digital learning opportunities (see Chapter 4, Sections 4.2.1.2 and 4.3.1.1 respectively). Bergdahl et al. (2019) claimed that student digital skills are largely unknown. Students who have not achieved a level to be able to confidently participate in digital learning are likely to experience adverse outcomes. For the students in this study that impact has been at the expense of their digital confidence.

Students who reported that school was not providing them with the opportunity to develop their digital skills, knowledge and strategies, found participation in information, communication and technology (ICT) courses not useful to their digital development either (see Chapter 4, Section 4.2.1.1). However, this finding is not fully supported in the available literature. Bergdahl et al. (2019), for example, found students who completed an ICT course during their secondary schooling reported increased digital confidence through a high level of digital skills. Irrespective of the completion of an ICT course all students in this study were concerned that they had not been taught how to use digital technology in their post school pathways.

5.2 Student Preparation for UG Studies in a DLE

The second theme that emerged from the data analysis is student preparation for UG studies in a DLE. The data gathered from the Yr13 student Yr13Q and Yr13PQ, the UG student TSSQ questionnaires and the UG lecturer AFG contributed to this theme (see discussion in Chapter 4, Section 4.2.2 [Yr13 Student], Section 4.3.2 [UG Student], and Section 4.4.2 [UG Lecturer results] respectively).

The successful progression of secondary school students into UG study is a priority for the NZ education system (Emerson et al., 2015b). One of the goals of the main national qualification for secondary school students in NZ is the preparation of NZ secondary school students for tertiary education (MoE, 2019). Today the preparation of secondary school students for the progression into UG studies needs to include the participation in the DLE because of the rapidly changing digital landscape. Furthermore, as this study has shown, to provide a successful transition experience there needs to be secondary school preparation and a learning experience that acknowledges the digital learning challenges that students experience.

5.2.1 Student preparation for UG studies

The analysis presented in the previous chapter (Section 4.4.2.2) has shown that there was an expectation expressed by UG lecturers that Yr13 students will enter UG studies prepared to participate in digital learning opportunities. Current literature concurs with this finding as the tertiary sector continue to hold the view that secondary education is responsible for the preparation of students to meet the minimum entry requirement to be eligible for admission into UG study in Aotearoa NZ (Burke da Silva et al., 2014; Emerson et al., 2015a). Hassel and Ridout (2018) nevertheless found that students are often not prepared for study at university. For example, in their research, there was the acknowledgement of students transitioning from a highly structured teacher driven environment to one where students are responsible for their own learning. If students are underprepared and unable to manage this transition there may be an impact on their ability to experience success in their UG students and student retention (Fomunyam, 2020; Hassel & Ridout, 2018). This is a view that is echoed by both Emerson et al. (2014) and Serdyukov and Hill (2013). Hassel and Ridout (2018) and Wong and Chiu (2020) both identified the importance of recognising tertiary educator expectations of students entering UG studies so that the mismatch between the expectations can be addressed. UG lecturers in the present study identified they want students to possess a level of digital literacy to enable them to confidently participate in digital learning opportunities (e.g. see Chapter 4, Section 4.4.2). However, Wong and Chiu (2020) place the responsibility on tertiary education to provide students with support to develop the necessary attributes to demonstrate their preparedness for UG studies. Furthermore, Wong and Chiu (2020) propose that UG education needs to make it transparent to potential students what level of preparedness is expected "so that students … are better informed" (p. 65) of the expectations. However, due to the amount of digitally focused learning that occurs in the NZ tertiary sector, the UG lecturers in this study propose that digital learning is incorporated into the secondary school curriculum and that it is aligned to their expectations to enable a seamless progression into UG studies. Pathways to UG study

The goal of NCEA is to prepare students for the diverse post school pathways and UG studies is one of those pathways. In their research on the transition of secondary students into the tertiary sector Emerson et al. (2015b) identified that there are concerns regarding student transition. The understanding of both secondary and UG sectors of each respective sector and greater cross-sector discussion were needed was identified as a factor that had an impact on student transition. Moreover, they found that tertiary educators were reluctant to engage in conversations regarding supporting student transition (Emerson et al. (2015b).

Overall the UG lecturers in the present study believed the Yr13 students' preparedness for UG studies is the responsibility of the secondary school sector (e.g. see Chapter 4, Section 4.4.2.2). As discussed in Section 4.2 of the previous chapter, most of the Yr13 students in this study agreed that Yr13 was preparing them for their transition pathways. They were confident in the digital environment and had continuous access to digital technology. This is a finding that is echoed by Dingli and Seychell (2015). However, the UG lecturers in this study reported that the Yr13 students did not possess the required digital skills, knowledge and strategies to prepare them for UG studies. The impact of the overestimation of Yr13 students self-reporting of their confidence for digital learning is an issue (discussed in Section 5.3 of this Chapter). Although there was the recognition in the data of the digital nature of the world today, there was a group of Yr13 students who reported feeling unprepared for their upcoming progression into UG study (see Chapter 4, Section 4.2.2.1). These students acknowledged that they were feeling uncertain regarding their unfamiliarity with the tertiary DLE. There was also a group of UG students who acknowledged this unfamiliarity on entry to UG study. They reported that they did experience challenges navigating their tertiary providers learning management system and the student intranet as it was different to the digital platforms they had engaged with during their secondary schooling (e.g. see Chapter 4, Section 4.3.2.1). Brunton et al. (2016) indicated that secondary school students may need to be supported during the transition phase into tertiary studies as they arrive in UG study with the skills, knowledge and learning strategies that have supported them to meet their needs at secondary school. These skills may not be adequate for their preparation for the digital learning requirements of UG study. These findings are relevant for most secondary school students who are embarking into UG studies (Porteous & Machin, 2018). There is the concern that students have to adapt to the new learning environment and student uncertainty in their preparedness for UG study was a theme that emerged in Porteous and Machin (2018) research. The importance of preparation is reflected in the response received from a UG student [UGS.44] in this study. This student, who had used the same LMS at both secondary school and in their UG studies, reported having a high level of confidence using digital technology for the purpose of learning (Section Chapter 4, Section 4.3.2.1).The opportunity for Yr13 students to engage with a LMS during their secondary schooling was not prevalent in this study. For Yr13 students to commenced their UG study confident and prepared for the DLE there needs to be the opportunity at secondary school to engage in the DLE.

Although the majority of Yr13 students in this study perceived secondary schooling was preparing them for the post school digital environment, there was a view expressed that they were not being prepared for digital technology use in their immediate future. The students perceived that this was mostly due to their teachers' expectations that through their level of everyday digital exposure students would be able to intuitively engage with the available digital technology and did not require a lot of support. This view is evident in the literature where today's students are described as knowing how to use technology from an early age (Adjin-Tettey, 2020; Hasmawati et al., 2020). However, a group of Yr13 students in this study (see Chapter 4, Section 4.2.2.1) held the perception that secondary school was not providing opportunities to develop and extend their digital knowledge, or participate in digital learning so they can develop their digital skills. They perceived they were only being preparing for UG study by having to complete their assessments digitally. This experience was further reflected by a group of UG students who have had limited digital exposure at secondary school (see Chapter 4, Section 4.3.2.1). This limited preparation and not being to be able to utilise all the aspects of digital technology for the purpose of learning can result in digital literacy issues for students. Adjin-Tettey (2020) described this as students not receiving the level of education required to be able to "read and understand, effectively navigate and use the [digital] technologies" (p. 19), and this is acknowledged as a feature in this study.

Yet, in contrast to the findings for the Yr13 student group, the majority of UG students nevertheless perceived that their level of digital exposure at secondary schooling prepared them for their UG studies. Overall they reported feeling at ease in the navigation of the UG DLE but there was more digital technology in their UG programme of study than they expected (see Chapter 4, Section 4.3.2). This is a view that is supported in current literature. For example, Burke da Silva et al. (2014) acknowledged that while students are aware that UG study will be different to secondary school, they are not clear as to what the difference looks like. Bowles et al. (2014) identified that a degree of this unpreparedness has been attributed to student expectations of how learning will occur. This was further evident in the present study as a group of students expected a more traditional learning environment accessing class resources digitally (see Chapter 4, Section 4.3.2.1). Respondek et al. (2017) proposes this occurs because UG students are wanting to be able to relate their secondary school learning experiences to their UG studies. Therefore, in the current study, with almost one fifth of the Yr13 participant group and a small number of UG students indicating a preference for a face-to-face teaching experience (see Chapter 4, Sections 4.2.2 and 4.3.2) the expectation of a traditional mode of teaching in their UG studies is not unexpected

5.2.2 Digital learning challenges

The acknowledgement of the challenges and distractions to digital learning that are offered by the presence of digital technologies are evident in the data. There is an indication in the data that students are only interested in undertaking independent learning during school time and that homework is frequently left uncompleted. This was evident with the OLR participation data as very few Yr13 students participated in the two homework sessions. The students reported that this was mainly due to extra-curricular activities, including work commitments (see Chapter 4, Section 4.2.2.2). The non-completion of homework for secondary school science students has been widely discussed in the literature. Maharaj-Sharma and Sharma (2016) and Xu et al. (2020) showed, for instance, that the distractions offered by digital technology have a negative impact on a student's motivation to complete homework assigned tasks. Flanigan and Kiewra (2017) refer to this behaviour as cyber-slacking, where students are not participating in assigned digital learning and are using their digital devices for purposes other than their learning. This finding was also evident in the current study with UG lecturers suggesting that students need to make the transition from using digital technology for social digital engagement to using technology for the purpose of learning (see Chapter 4, Section 4.4.2.1). The impact of digital devices on student learning is a feature in this research. For example, the UG lecturers proposed that to be considered digitally literate students must manage the digital learning distractions. This view is further supported in the current literature. For example, Anthonysamy (2020) discuss the importance of students possessing a level of digital literacy to manage digital distractions and participate in digital learning opportunities. The distractions offered by digital technology was put forward as a reason some Yr13 students in this study disliked the digital mode of delivery and were unable to improve their levels of digital confidence (e.g., see Chapter 4, Section 4.2.2.2). Rosen (2017) notes that the impact of digital distractions on students' ability to focus on their learning tasks has been increasing. The challenge for Yr13 students, who indicated that they are not always able to remain on task and complete assigned digital learning requirements due to the presence of digital distractions, is that this behaviour may have an impact on their learning requirements as they progress into UG studies.

UG lecturers, in turn, suggested that to meet their digital learning requirements, manage and facilitate their learning and experience success in the tertiary sector, UG students need to demonstrate confidence, competence and independence. The UG lecturers acknowledged that the students need guidance to make the transition from the structured learning environment of secondary school and to self-regulate their learning (see Chapter 4, Section 4.4.2.1). Self-regulated learning was viewed as both purposeful and evident when students are able to demonstrate that they are acquiring, and applying, both skills and knowledge to meet their learning needs (Bradley et al., 2017). Students need to demonstrate a level of confidence to be able to self-regulate throughout their digital learning experiences. Yot-Domínguez and Marcelo (2017) suggested that if students are not using digital technology to manage and facilitate their learning, it is the responsibility of the educators to provide students with the opportunities to develop in this area. According to Yot-Domínguez and Marcelo (2017) students who are using digital technology in their personal lives should be using technology in their education experience. Educators need to provide the digital learning opportunities to enable students, with guidance and support, to develop the strategies to be successful in the DLE.

5.3 Confidence for Digital Learning

The third theme to be discussed is confidence for digital learning. The data gathered from the Yr13 student Yr13Q and Yr13PQ and the UG student TSSQ questionnaires contributed to this theme (see discussion in Chapter 4, Section 4.2.3 [Yr13 Student] and Section 4.3.3 [UG Student] respectively). The development of student digital confidence includes both access to digital learning opportunities and access to digital learning resources. In this theme, the sub-themes for each student participant groups were the same and as explained in Section 4.3 of this thesis and this was an anticipated outcome of this study.

Student digital confidence is important in the process of developing into an individual "who can fluently combine digital skills, knowledge and attitudes to enable the participation in society as an active, connected, lifelong learner" (Netsafe, 2018, p. 5). For Yr13 students, part of their lifelong learning includes their post school pathways and the progression from secondary school into UG studies. According to the MoE (2020) confidence in the digital environment is an important aspect that students need to be able demonstrate to effectively utilise digital technologies and participate in their learning.

Both the Yr13 and UG students involved in this research indicated they have a positive level of confidence in their ability to use digital technologies with 59% of Yr13 students and 51% of UG students self-assessing that they have an above average level of digital confidence as shown in Chapter 4, Sections 4.2.3 and 4.3.3 respectively. Generally they believed they possessed digital skills at a level that enabled them to digitally participate across all aspects of their life. These findings concur with research conducted by Burton et al. (2015) who identified that students under the age of 30 displayed high levels of digital skills, knowledge and strategies in the digital environment. Nonetheless, other researchers, such as Porat et al. (2018) in their study on students perceptions of their abilities in the digital environment, found that students over-estimated their actual digital ability. Their findings included the consideration that digital confidence is more than the ability to utilise digital technologies in the context of education.

The Yr13 and UG students in this study attributed their high level of confidence not to their digital education experiences but to their generation cohort which provided them with continuous exposure to digital technologies. Dingli and Seychell (2015) related this generation cohort confidence to being "individuals, who do not find the complexity of the digital era … problematic" (p. 9) as the presence of digital technology is a component that has occurred naturally in their landscape. This contrasts with earlier generations where digital technology has been introduced to their environment. This naturally occurring digital exposure across the environments in which both the Yr13 and UG students interacted is evident in the data. While this theme did not emerge from the UG lecturer data, there was an acknowledgement from UG lecturers that students today have a high level of digital competence in navigating the internet due to prevalence digital technology. For the UG lecturers their concern was developing their preparedness to teach in the DLE (see discussion in Section 5.6 of this Chapter). Furthermore, as shown in Chapter 4, Sections 4.2 and 4.3, most Yr13 and UG students engaged with some form of digital technology every day in their social environments which they reported feeling supported their levels of digital confidence more than their secondary schooling experiences. Due to this naturally occurring digital exposure, some Yr13 students' perceived school provided limited access to digital programmes and, as result, did not provide them with the opportunity to develop their digital confidence and experiences.

5.3.1 Access to digital learning opportunities

Despite the generally held view that today's students are able to utilise digital technologies with a level of ease and expertise, Fraillon (2020, August 5) cautioned that digital exposure does not translate to confidence in the digital environment. This, however, is not evident in the data for this study. For example, the Yr13 students in this study found that due to their level of digital exposure their confidence using digital technology for the purpose of learning was slightly higher than their everyday use with 64% of Yr13 students self-assessing that they have an above average level of digital confidence when they are participating in digital learning activities. As discussed in Chapter 4, Section 4.2.1, the Yr13 students attributed this difference in their confidence levels to the digital programmes that are available at secondary school. They perceived these programmes as not challenging to use and requiring a low level of knowledge and skills to navigate unlike the programmes they engage with outside of the classroom. One Yr13 student, [Yr13S.78], in particular, was of the impression that the school programmes were designed for school aged children and as a result reported feeling disinterested in digital learning opportunities. Famurlarshi (2020) echo these findings and identified boredom can be an issue for students who do not feel challenged in the DLE. Additionally, there was a view expressed by a student [Yr13S.16] (see Chapter 4, Section 4.2.1) who reported that the school web filters restricted their ability to develop their digital confidence. The view is shared by other Yr13 students in this study who reported feeling restricted by the school web filters. It is a view that is supported in the literature. For example, in their research on student experiences of technology integration, Hughes and Read (2018) found students were frustrated when they were restricted at school from accessing content that was easily accessible to them at other times. Nonetheless, in Level 2 of the NZ education system (refer to Figure 1.1 in Chapter 1) web filters are compulsory in NZ schools.

Generally, the ease of navigation in relation to student digital confidence was evident in the UG student data (see Chapter 4, Section 4.3.3). These findings are consistent with Howard et al. (2016) who found that students who have a high level of digital exposure are more likely to be confident using digital technology for the purposes of learning. However, in the present study, there was a small group (7%) of UG students who reported that once they entered tertiary study, they realised that they were not as confident using digital technology for the purpose of learning as they did not have the required digital skills, knowledge or strategies to navigate the UG DLE. This is a finding that is contrary to the current literature, as it is generally presumed that if students have confidence using digital technology for personal use, there is a correlation with confidence when participating in digital learning (Al-Zahrani, 2015; Xu et al., 2018).

Overall, UG students in this study indicated they had a high level of confidence in the DLE on entry to tertiary studies. For example, for 51% of the UG students there was no difference overall between their everyday digital confidence and their digital confidence for the specific purpose of learning (see Chapter 4, Section 4.3.3). This finding is consistent with Hong and Kim (2018) and Hong and Gardner's (2018) research on preparedness for UG level of study who further determined that students with a high level of digital confidence are, generally, better prepared for the DLE. However, some UG student participants in this study reported that, at the commencement of their UG studies, even with a high level of digital exposure, their digital learning confidence was lower than their digital technology confidence. This difference was attributed to how they perceived digital learning was going to occur in their UG programme. For instance, a fair number of UG students indicated that their main digital learning activity during their secondary schooling was assessment completions and submission; an experience that was supported in the Yr13 student data. This finding is consistent with research undertaken by Adeoye and Adeoye (2017) who found that 71% of UG students who participated in their study utilised digital technology for school projects. Due to this emphasis on assessment completions, some UG students in the current study recognised that they lacked the skills in the area of digital learning, for example database and internet research, LMS navigation and using productivity software, and needed to develop their digital literacy levels across a range of areas to be able to participate in their UG digital learning opportunities. This corresponds with the findings of Parkes et al. (2015) who identified that students with a lack of exposure to digital learning opportunities at secondary school had a low level of preparedness for the digital expectation of UG studies.

However, all Yr13 students in this study indicated they had been exposed to digital learning opportunities as part of their classroom experience at the time this research was undertaken. The issue for students in this study was the lack of digital learning opportunities at school that were not assessment related. As part of this research Yr13 students were provided the opportunity to participate in a range of activities in an Online Learning Resource (OLR) (see Chapter 3, Section 3.4.2.2). These OLR activities included online tests, development of a resource database, forum postings and collaboration with researcher and peers. While most of the Yr13 students indicated that participating in the OLR did not have an impact on their levels of digital confidence, there was a small number of Yr13 students who did experience an increase in their digital confidence post OLR participation (see Chapter 4, Section 4.2.3). These students reported that having the opportunity to participate in digital learning supported the development of their confidence in using digital technology for the purpose of learning. As indicated by Parkes et al. (2013) in their research on student preparedness for the digital expectations of university, the lack of opportunities to participate in the DLE may impact on a student's assessment of their level of digital competence. However, in this research the presence of a learning management system did not significantly influence Yr13 student digital confidence. Students found they were not motivated to engage with this platform.

It is important to acknowledge that it was evident in the data that the student experience in a DLE was variable, which is similar to the findings reported by both Adhikari et al. (2017) and Howard et al. (2016). For example, a small number of Yr13 students in this study, regardless of their level of digital exposure, were not confident utilising digital technology for the purpose of learning. For this group of students orientation to the digital environment was important to support them to confidently navigate the digital learning platforms. This was an issue that was further identified by Smith and Chipley (2015) who pointed out that exposure to unfamiliar digital environments, without adequate support, can impact a student's level of digital confidence. Furthermore Newton (2018) recognise the need for digital orientation for students who are unfamiliar with the digital technology that is required to enable them to participate in their digital learning experience.

5.3.2 Access to digital resources

The students in this study indicated that their confidence was further impacted by the stability of their school's digital infrastructure, primarily a slow or unreliable internet connection. This impact on student confidence is supported by a survey conducted in the United Kingdom where 52% of tertiary education students surveyed had their learning experience interrupted by the quality of their education providers internet (Office for Students, 2020). The inadequacy of the digital infrastructure to support student digital learning experience in NZ is acknowledged by Newton (2018) who recognised that not all NZ schools are able to provide the digital infrastructure to enable students to participate in quality learning experiences to develop their digital ability. Another infrastructure factor that impacted on student confidence was the school web filtering. While students acknowledged that there were distractions to their learning that were facilitated by the presence of the internet, they reported that the web filter settings were too restrictive and that this affected their confidence for digital learning. This perceived over-restrictiveness meant they were not always able to access programs they perceived were necessary for achieving their learning outcomes. This perception of restrictiveness was also acknowledged in a study by Ahmed (2017) where 46.8% of students viewed web filtering as having a negative impact on their learning. Goriss-Hunter et al. (2021) has identified that the amount of control that is present in the classroom environment has a negative impact on student motivation to engage with the DLE as it impedes the development of their digital confidence.

Furthermore, there was a high level of at school digital access for all Yr13 students in this study. All of the secondary schools who participated in this study had a BYOD policy in place and most students were aware of this policy and had access to a digital device during school time. This access was through either personal or school provided device. However, there were device access issues for a small number of students in the study, which limited their ability to participate in learning opportunities in the classroom. While the secondary schools provided digital devices, the availability of these devices was at times limited. Additionally, all the students affected did have access to a smartphone but as it was not an approved BYOD by their secondary school, and as such, they were unable to use their smartphones for the purpose of learning in the classroom. Previous studies have identified in the pre-COVID-19 environment smartphones were the device of choice to access the DLE

(Lazarus et al., 2017). However, in a study of NZ schools IDCNZ (2018) found as part of the school BYOD programme smartphones are rarely supported as a device sanctioned for use in the classroom. Their study found that “for many schools smartphones are still view as a distraction” (p.10) and that there are were safety concerns due to the ease of mobile internet access. This accessibility meant students were not using the compulsory connection to school networks and were able to avoid web filters. Therefore, while the schools attempted to address the digital device access an unintended equity issue resulted as students’ access to learning opportunities were limited. This finding is consistent with Adhikari et al. (2017) research in that any barrier to participation in digitally focused environment creates an learning inequity. This inequity affects the students’ ability to positively participate in digital learning opportunities including the development of their “skills, knowledge and confidence to maximise the opportunities the effective use of technology can bring” (Netsafe, 2015, p. 2). The access to the most available digital devices in this research occurred mainly through smartphones and laptops. Ott (2017) claimed in his research that due to the increasing presence of mobile phones for school related activities, mobile phones are part of the school infrastructure when used for the purpose of learning. In the COVID-19 pandemic when students were required to study via a DLE Udeogalanya (2021) found the smartphone was the most popular device with 45% of students surveyed using a smartphone to access their digital learning resources. Ott (2017) has suggested that it is not the lack of the presence of digital technology that limits the access to digital learning opportunities, but access that affects a student’s ability to participate which impacts their digital confidence. This was the case for some Yr13 students in this study who have digital technology but are unable to engage in the DLE due to their device not being a school approved device or software incompatibility.

The notion of access to digital resources is changing and there is the expectation students will enter their study with a device to participate in the DLE. Hossain et al. (2020)

The data for this study has revealed that there is confusion for Yr13 students regarding access to digital learning opportunities. When discussing their access to digital resources the students in the present study considered engaging with the internet as equating to digital learning. While Lin et al. (2017) concurs with this perspective, the internet is viewed as a component of digital learning. For example, Apuke and Iyendo (2018) refers to the internet as a tool that students “make use of […] to facilitate their studies” (para. 8). The misunderstanding of the relationship between the internet and digital learning in this study maybe a result of the lack of digital exposure as previously discussed in this chapter.

The ability to access digital learning and the resulting development of digital confidence was also acknowledged by the UG students in this research. However, access to digital learning during their secondary schooling to prepare them for the UG DLE has been variable for this group. For example, as discussed in Chapter 4, Section 4.3, the majority of UG students in this study attended secondary schools who did not have a BYOD policy. As with the Yr13 students, there were some UG students whose digital learning experience at secondary school was focused mainly on assessment submissions and the use of the digital devices was limited in the classroom by the teacher. The importance of BYOD and the development of student digital confidence has been recognised by Romell et al. (2014) who found that the familiarisation of student owned digital devices provide students with a degree of confidence in the DLE. Therefore, for Yr13 students’ confidence in the DLE and being able to consistently utilise a combination of their digital skills, knowledge and strategies are important factors as they progress from secondary school into tertiary studies.

5.4 Student Learning Preferences

The third theme that emerged from the data analysis is student learning preferences. The data gathered from the Yr13 student Yr13Q and Yr13PQ, and the UG student TSSQ questionnaires contributed to this theme (see discussion in Chapter 4, Section 4.2.4 [Yr13 Student] and 4.3.4 [UG Student] respectively). The findings suggest that access to digital learning opportunities and the impact of student digital literacy both have an impact on students’ ability to access available digital learning opportunities.

As discussed in Chapter 4, Section 4.2.4, Yr13 student learning preferences were varied and ranged across the learning continuum. It is interesting to note that a small group of Yr13 students in this study indicated a preference for traditional learning opportunities. This finding is supported by the literature. For example, in a study focused on the modes of teaching, Burton et al. (2015) similarly found that 60% of students who are part of the 21st century student birth cohort preferred a face-to-face mode of teaching delivery. A finding that is supported by Yates et al. (2020). The group of Yr13 students in the current study viewed traditional learning as a physical activity and wanted to be able to use pen and paper more in their learning. There was evidence in the data that they used digital technology for researching only and that some Yr13 students in this study actively avoided digital technology in their learning altogether (see Chapter 4, Section 4.2.4.1). According to Bergdahl et al. (2020) this unwillingness to participate in digitally facilitated learning could be related to a digital skill issue. Students with digital skills concerns are more likely to use technology for entertainment purposes and as a distraction to class when they are unable to manage assigned digital learning opportunities (Bergdahl et al., 2019). However, Green et al. (2020) proposed that dialogue needs to move away from either the face-to-face or digital mode of teaching. They suggest that the focus needs to be on how the learning occurs in the post-digital environment and this may encourage students to broaden their understanding of how and where learning occurs. In this study there were Yr13 students who expressed feeling uncertain about their transition into the UG students as they did not feel they had been well prepared for the digital expectations. These students need more support to be able to "move easily from one mode to another, from the actual world to the virtual, to best allow for the successful navigation of their digitally-intertwined futures" (Gibson & Smith, 2018; p. 9). There is an acknowledgement in this study of a gap between the Yr13 student secondary school experience and the 'inherent' digital requirements for UG study [UGL.4]. The tertiary sector expects students have the skills and knowledge to learn in the digital space.

5.4.1 Student knowledge and skill development

The students in this study acknowledged that the classroom is becoming increasingly a digital learning space, which for some students causes frustration (e.g., see Chapter 4, Section 4.2.4.1). Lai and Lee (2019) found that the classroom is becoming dominated by digital technology, with a shift from the traditional classroom to a focus on a blended learning mode of teaching delivery. Students in the current study perceived that they have been moved into the DLE without the adequate preparation at times. This was recognised by one particular Yr13 student [Yr13S.25] who identified that although they preferred face-to-face delivery, they did not have a choice regarding digital delivery and acknowledged that it is the way that education is delivered today (see Chapter 4, Section 4.2.4). There is a view present in the literature that for today's students, who have been predominantly immersed in a digitally focused environment, learning preferences are unlike those of any generation before them (Koumachi, 2019). Brooks and Pomerantz (2017) found, for example, that 79% of the UG students in their study preferred courses with a digital component. However, in this study almost one fifth of the Yr13 participant group and a number of UG students still indicated a preference for the face-to-face teaching experience. This is a finding that is in direct contrast to Greener and Wakefield (2015) view that students today want a classroom environment that is transforming into a digital space. In contrast, the present study included Yr13 students who wanted the opportunity to write notes on paper, circle, annotate and highlight documents and study from workbooks (e.g., see Chapter 4, Section 4.2.4). This was especially true for students who progressed directly from secondary school to UG studies. They indicated that they still tended to handwrite their notes and had the view that because they were visual and auditory learners they believed they needed an environment where they could be physically present to listen to discussions. While there was a lack of understanding from the UG students in this study that DLE is able to provide direct interaction through synchronous, face-to-face, learning experiences, it was their opinion that the DLE could not meet their learning preferences. Van Wart et al. (2020) have identified students who preferred face-to-face classes are more concerned about the loss physical interaction with their teachers and peers rather the mode of teaching delivery. While Samsonov (2021) found UG students preferred a hybrid delivery model, UG students in this study further indicated that their learning strategies were typical of a face-to-face, traditional teaching format and they were not ready to make the transition to a digitally focused teaching format (e.g., see Chapter 4, Section 4.3.4.1). Costa et al. (2018) concur with this view. However, Eri et al. (2021) found for UG students who preferred a traditional teaching format their confidence did improve when they had to make the transition to a DLE. Howard, on the other hand, claimed that teachers expect that today's students want to participate in the DLE and are confidently able to use digital technology for the specific purpose of learning. However, for a number of Yr13 and UG students in this study there was a lack of understanding regarding the learning opportunities that can be offered in the DLE. Nortvig et al. (2018) describe this as students perceiving how digital learning can occur rather than the learning that is able to occur. For one UG student [UGS.21] this perception included the belief that learning was not effective when delivered via a digital device (see Chapter 4, Section 4.3.4.1). Current literature concurs with this view. For example, McCoy (2013) identified that digital technology impedes student learning and students learnt less in the class environment when digital learning was occurring due to the presence of digital distractions. McCoy later expanded his study and discovered the negative impact of digital devices on the learning environment had increased since 2013 (McCoy, 2016).

As previously explained, the students in this study were predominately focused on the use of the internet for assessment related work. Costa et al. (2018), who found that UG students were mainly focused on participating in digital learning opportunities that contributed to assessment completion, echoes these findings. Pechenkina and Aeschliman (2017) similarly found that students tend to have a very narrow view of the use of digital technology in their learning. In this study, students frequently cited the internet as their level of digital technology engagement and that they used the internet mainly for assessments, research and to access course materials. The students were reluctant to fully engage with digital technology unless they were already familiar with the technology in question or if they perceived the digital technology as useful to their learning (see Chapter 4, Sections 4.3.4.2 and 4.3.4.1 respectively). In their study Pechenkina and Aeschliman (2017) found more than half of their study participants preferred a learning approach that included both digital and face-to-face mode of delivery, a blended approach. Furthermore, the unfamiliarity with digital software was identified as a feature in this research that impacted on the learning experience for some students. As indicated in Chapter 4, Section 4.2.4, there was also an issue of complexity of digital learning software identified in the data. Students in this study acknowledged the importance of digital technology to assist them to meet their learning goals and this finding is supported by Lai and Lee (2019) research as well.

Traditional learning environments are different from DLE's and students need to have access to teacher guidance to support the development of their digital confidence. This support needs to occur through digital learning opportunities in the classroom, which in this study was identified as an issue. Nortvig et al. (2018) concur with the findings of this study in that teacher presence is an essential factor in the encouragement of student digital participation. The teacher presence in the digital space, in both the physical and digital classroom, was found necessary to engage with students in this space (see Chapter 4, Sections 4.2.4.2 and 4.3.4.3 respectively).

Notwithstanding the above, the present study included UG students who expressed satisfaction with, and preference for, the digital learning format. They acknowledged that the digital format was relevant to their learning needs. They found digital learning offered convenience and accessibility of digital learning resources to provide them with independent learning opportunities (see Chapter 4, Section 4.3.4.1). This group of students was mostly confident in the digital environment and able to participate in the digital learning opportunities offered. Costa et al. (2018) acknowledged that the ability of students to be able to participate in digital learning is linked to their confidence in the digital environment. Adhikari (2018) described this as the development of digital confidence as being related to digital inclusion where students are provided the opportunity to participate in digital learning and, as a result, have greater control over their learning.

Students acknowledged the independence afforded with digital learning while recognising the freedom of not having to participate in all digital learning opportunities there was evidence in the data of the presence of a digital divide (see Chapter 4, Section 4.3.4.1). This divide had an impact on students' ability to develop their digital confidence. For some students cost of both the internet and digital devices was cited as a factor that limited their access to the DLE. Adhikari (2018) identified in their research that the cost of digital access was a significant impactor in the NZ education system which prevents student access to learning. Newton (2018) concurs with this view and agrees that access to digital learning opportunities is essential in the development of student digital confidence. For students with digital access issues, to ensure they are able to able to engage with and participate in a DLE with confidence, schools must be resourced to provide a technology rich environment (Marbeck, 2020).

5.4.2 Educator approach

For the UG students in this study a further factor that impacted on their learning preferences was the digital confidence of their lecturers (see Chapter 4, Section 4.3.4.3,). Newton (2018) identified the importance of both students and their teachers for students to be able to confidently and effectively participate in the digital environment. In this study students want lecturers to display a level of presence to be able to fully engage students in their digital learning experience. Furthermore, students expected their lecturers to be able to problem solve digital technology issues to maintain a seamless digital learning experience. In their study across Australia and Asia higher education institutions Eri et al. (2021) found student disengagement occurred when they had a unpleasant experience with the DLE. Students attributed this to the under preparedness of their institution for digital modes of learning.

Garzon-Artacho (2021) acknowledges there has been an increasing presence of digital technology across the education sector, which has transformed into an integral component of pedagogy. Through this transformation, teachers today need to be able to integrate both current and emerging digital technology to enable student learning in the DLE.

According to Newton (2018) this includes teachers making adjustments to their teaching practice, which students in this study have requested. UG students want an increasing level of digitally focused learning in the classroom to enable them to develop their digital skills, knowledge and strategies to succeed as digital learners. The current education environment requires educators to have a level of digital competence and confidence to be able to develop engaging digital content and integrate emerging technology to support the student learning experience (Garzon-Artacho, 2021). Both student cohorts in this study want learning to be authentic, so that their confidence with digital technology for learning improves. In this study there is further evidence that Yr13 students did not always find digital learning opportunities as challenging and they expressed feelings of disinterest in their digitally focused learning (see Chapter 4, Section 4.2.4.1).

This research identified that both UG and Yr13 students want their teachers to be able to provide advice and guidance on how to use digital technologies. There were instances in the data where students were being asked by their teachers to provide digital support as challenges arose. Students do not always want to be asked to provide digital support in the classroom as they want to be able to focus on their learning. However there were times when, due to a lack of knowledge and/or support from their teachers, students were unable to complete their digital learning activities. This finding is consistent with Bergdahl et al. (2019) research findings where they identified the need for support from teachers as students may not possess the level of digital knowledge required to complete the assigned digital learning. If teachers are unable to provide students with the support needed to make the transition to a digital teaching mode, students will be required to discover their own solutions which may not always have a positive outcome on their learning. In this research there were instances where students expressed negative feelings toward their digital learning when their teachers were unable to provide them with support that they perceived they needed to meet their learning needs to enable an effective digital learning experience.

5.5 Availability of Digital Learning Opportunities

The fifth theme that emerged from the data analysis is the availability of digital learning opportunities. The data gathered from the UG lecturer AFG contributed to this theme (as discussed in Chapter 4, Section 4.3.1). The findings suggests that access to digital learning opportunities and the impact of student digital literacy has an impact on students' ability to access available digital learning opportunities.

5.5.1 Providing access to digital learning opportunities

Authentic digital learning opportunities need to be available to students to enable them to develop their digital confidence. Overall the student participants in this study perceived that they have a high level of digital confidence as discussed in Section 5.3 of this chapter. However, Porat et al. (2018) research findings hinted at the presence of student over-estimation when they self-reported their perceived digital confidence. Porat et al. (2018) related this over-estimation to the students' digital exposure in the digital space. In this digital space the students focus is development of their digital knowledge, skills, and strategies, their digital literacy, to maintain their social presence. Furthermore, the maintaining of their social digital presence was "only relevant in promoting technical-operational skills" (Porat, 2018, p. 32) rather than the development of necessary educational tasks. There is an indication of the impact of their social digital presence on digital literacy in this study, for example, as a group of students admitted that their digital exposure occurred primarily in their social environment (refer to Section 5.4.1 above for discussion of this issue from the student perspective). Hardy (2015) suggested that due to the effect of a digital social presence students today are *"tech-savvy teens, not tech-smart adolescents"* (p. 11). To address this, Porat et al. (2018) propose that to develop students' ability to effectively use digital technology for the specific purpose of learning, they need access to "appropriate and sufficient learning and training in digital environments" (p.32). Crittenden et al. (2019) encourage tertiary education to provide students with the knowledge of how to utilise digital technology for the purpose of learning. In their research on the readiness of UG students for their UG DLEs, Koh and Kan (2020) identified educators need to be prepared to deliver learning opportunities through a digital mode of teaching delivery. The UG lecturers who participated in the present study experienced students who have been unable to participate in the digital interface. They have attributed this to students not being "comfortable" [UGL.3] in a DLE (see Chapter 4, Section 4.3.1). Blayone et al. (2017) and Sun et al. (2018) determined the design of the learning environment is a contributor to student comfort in the digital space, which in turn leads to increased interest in participation in digital learning.

The UG lecturers in the present study identified that digital learning opportunities need to be provided that are both contextual and relevant to student learning in a rapidly evolving space. There is the recognition that learning can be interrupted by new and evolving technology; from software updates to the rapid expansion of digital technology available for learning. As discussed in Section 4.3 of the previous chapter, the UG lecturers who participated in this study generally acknowledged the importance of providing students with digital learning opportunities in the developing of their ability to participate in digitally focused learning experiences.

5.5.2 Impact of digital literacy

The UG lecturers who participated in this study recognised that not providing students with the opportunity to develop their digital ability would have an impact on their ability to engage with digital technology. This would affect their success both academically and in their post education pathways. It was recognised as important to develop student digital confidence through the development of their digital literacy (see Chapter 4, Section 4.3.1). Passey et al. (2018) noted in their research on digital agency that students must be taught and provided with the opportunity to practice digital literacy to improve their digital access. As discussed in Section 4.3.1 of the previous chapter, in the present study, digital exclusion was identified by the UG lecturers as a consequence of a lack of digital literacy development. This is a finding that is supported by Wilson and Grant (2017) who in their research estimated that in the United Kingdom as many 300,000 young people are digitally excluded as they do not possess a basic level of digital skills which in turn affects their digital confidence.

The findings from the present study further indicated a gap in educators' perceptions. For example, while the UG lecturers in this study primarily viewed digital literacy as a set of skills that students need to possess, the NZ curriculum views digital literacy as being wider than skills and incorporates the knowledge and strategies that are required to be able to fully participate in a digitally-enabled society (Netsafe, 2015a).

Coldwell-Neilson (2017) and Becker (2018) describe digital literacy as an essential skill. According to Becker (2018) students need to be provided with opportunities to learn digital literacy and it is not an innate concept. However, UG lecturers in the present study suggested that digital literacy should be taught as a secondary school subject in order to have students prepared for the digital expectations of UG studies. Emerson et al. (2015b) echo these findings as they found that the tertiary sector expects students who transition to UG studies to be able to meet UG learning expectations from the moment they arrive. This expectation of the UG lecturers in this study fails to acknowledge the difference in the secondary and UG learning environments (Ainscough et al., 2017). Moreover, Coldwell-Neilson (2017) identified that there is no agreed understanding in the educator sectors of what students require to be digitally literate. The findings from this study suggest that students' inability to use digital technology due to a digital literacy issue created both disadvantages and stress for the students (see Chapter 4, Section 4.3.2).

5.6 Preparedness of Educators to Support Student Digital Confidence

The sixth and final theme that emerged from the data analysis is the preparedness of educators to support student digital confidence. The data gathered from the UG lecturer AFG contributed to this theme (as discussed in Chapter 4, Section 4.4.4, in particular). The findings suggest that the digital literacy of UG lecturers and their access to professional development opportunities has an impact on the education sectors ability to support student digital confidence.

In today's DLEs the role of the educator has been described as encompassing a number of challenges (Greener & Wakefield, 2015; Sharma, 2017; Srivastava & Dey, 2018). Srivastava and Dey (2018) identify these challenges as being extrinsic to educators and "include a lack of resources, time, access and technical support" (p. 78). For one UG lecturer [UGL.3] in the current study the challenge was the digital language (see Chapter 4, Section 4.4.4). This is a situation that is supported Oriji and Torunarigha (2019) who identified that a challenge for a cohort of educators today "have to learn to communicate in the [digital] language and style" (p. 345) of their students. In this study UG lecturers generally acknowledged that they need support to develop their digital skills and knowledge and one UG lecturer [UGL.1]described this as the developing of "capability in digital discovery" (examples of UL.1's perceptions as discussed Chapter 4, Section 4.4.4) and overall they felt underprepared for the digital expectations of the NZ education sector. This finding is supported in the literature by research conducted by van der Spoel et al. (2020) who further noted that teachers generally felt unprepared to implement digital learning initiatives. This unpreparedness contributes to the presence of digital difference in the digital classroom where there is a gap between the digital experiences of students and their teachers. Current literature concurs with this finding. For example, in a 2016 study investigating the preferences of Generation Z students, Cilliers (2017) found 85% of educators surveyed felt, when compared to their students, that they possessed less digital knowledge.

There is an expectation that educators will seamlessly implement a digitally focused curriculum and a group of Yr13 students in this study did indeed indicate that they had experienced teachers who preferred a traditional teaching mode and did not always provide digitally focused learning opportunities (refer to Section 5.4.1 above for discussion of this issue from the Yr13 student perspective). The UG lecturers who participated in this study acknowledged the potential that the successful integration of digital learning opportunities offers to students (see Chapter 4, Section 4.4.4.1). The need for successful integration is recognised by Smith and Chipley (2015) who suggested that a lack of educator support in a DLE has the potential to negatively impact a student's level of digital confidence.

Furthermore, Gibson and Smith (2018) proposed that students who are provided with the opportunity to develop their digital literacy throughout their education journey experience greater effectiveness in their studies and are more employable at graduation.

5.6.1 Educator digital literacy

In the NZ education context digital literacy has been defined by the NZ's online safety organisation as the skills, knowledge and strategies that are required to be able to fully participate in a digitally-enabled society (Netsafe, 2018). For an educator this full participation includes the ability to successfully adapt to a redesigned curriculum where the digital teaching format is the mode of delivery. Roddy et al. (2017) observe that, traditionally, there has been concern regarding student digital abilities to participate in digital learning opportunities, and educator digital preparedness is emerging as a factor that requires attention. In their research on the UG students and technology Brooks and Pomerantz (2017) discovered that UG educators were, overall, implementing digital technology in some form in their teaching. However, Brooks and Pomerantz (2017) noted that, in their research, motivation to implement digital technology was a concern for some UG educators. This was a feature in this research with the self-reporting by Yr13 students of teachers not wanting to move into the digital teaching space (refer to Section 5.1.1 above for discussion of this issue from the student perspective). The reasons for this are not clear, and the secondary teacher voice is not part of this thesis. In the UG space, UG lecturers who participated in this study acknowledged the need to be continually upskilling to meet the changing and evolving digital requirements of their respective organisations and to provide students with authentic learning experiences. This will also meet the needs of the students in this study who described digital learning as non-challenging. This finding is consistent with the findings of Greener and Wakefield (2015) study who identified that there is a disconnect between student digital learning expectations and educator digital competency and preparedness. In 2017, Al Khateeb's research on teacher digital competence showed that teachers did not possess a level of digital competency needed to be able to facilitate learning in the digital environment. Educators, across all levels of the education system, need to develop their digital knowledge to be able to successfully implement a digitally focused curriculum and all UG lecturers in this study acknowledged the potential digital technology can provide student learning experiences.

For all the UG lecturers in this study, the majority of their digital skills were self-taught. They developed them through either their own experiences as distance students or by experimenting with the technology, a trial and error approach. These findings corroborate with those observed by Cote and Milliner (2018) who found that for 78% of the university lecturer participants in their study digital skill development was self-taught. In their integrative review Roddy et al. (2017) identified that a critical factor for making the transition from a face-to-face to a DLE are educators who are trained to deliver digital content. Educators need to be implementing digital technology as an interactive tool to support their teaching, while role modelling to their students how to utilise digital technology for the purpose of learning (Crittenden et al., 2019). Sun et al. (2018) point out the importance of educators to have the required digital knowledge to be able to scaffold digital learning as it is necessary for student participation in digital learning opportunities.

5.6.2 Professional development opportunities

Greener and Wakefield (2015) identified there are a number of barriers for tertiary teachers to be able to develop their confidence to make the transition from a traditional to digital teaching format. In this context, the UG lecturer (UL.7) who shared using a trial and error approach (see Chapter 4, Section 4.3.4.1) recognised that this approach to professional development can create issues as gaps in their digital knowledge have occurred during teaching. This is a finding that is supported by Roddy et al. (2017) who proposed that without adequate digital knowledge educators may be unable to resolve digital issues as they arise during the digital student engagement sessions. This is situation is evident for the UG lecturer who shared that they developed their digital knowledge by a trial and error approach (e.g., see excerpt of UL.7’s experience as discussed in Chapter 4, Section 4.3.4.1). When faced with these situations educators in this study sought the support of students to resolve the issues (e.g., see discussion in Section 5.4.2 of this chapter for the student perspective of being asked to provide support to their teachers).

As DLEs continue to be implemented by the education sector and new digital learning technology is developed, educators will need to have access to professional development opportunities so they can remain abreast of digital learning and teaching developments (Ally, 2019). This was acknowledged as a factor for the UG lecturers in this study who expressed comfort with their current level of digital ability but recognised that they would not be able to easily make the transition to newly introduced technology. While the UG lecturers in this study were focused on digital skill development, the literature suggests that professional development opportunities need to be focused on more than digital skills development. Thacker (2017), for example, proposes that professional development should be focused on pedagogical knowledge to develop their digital teaching practice to ensure students have authentic digital learning experiences.

5.7 Chapter Summary

This chapter has synthesised and summarised the results of the research findings. Six overall themes that emerged from the analysis of the student and UG lecturer data were discussed. These six themes were: (1) Supporting the development of student digital confidence through digital responsiveness; (2) Student preparation for tertiary studies; (3) Confidence for digital learning; (4) Student learning preferences; (5) Availability of digital learning opportunities and (6) Preparedness of educators to support student digital confidence. The importance of these themes and sub-themes in relation to the current literature and rationale for this study was discussed in Sections 5.1 to 5.6 respectively. The strengths and limitations of this study, recommendations and implications for future research will be discussed in the next chapter.

Chapter 6 Conclusions

This research in this thesis explored the perceptions of Yr13 biology students, first year UG students enrolled in health science disciplines, and health science UG lecturers regarding the preparedness of Yr13 biology students for the digital learning expectations of the New Zealand (NZ) tertiary sector. It sought to provide data for both the secondary and tertiary sectors to enable a smoother transition for secondary students into tertiary level study in order to meet the NZ Government's expectations (Ministry of Education|Te Tāhuhu o te Mātauranga [MoE], 2014c). This chapter will now address each of the subsidiary research questions by providing a summary of the overall conclusions based on the evidence presented in Chapters 4 and 5. These findings are presented in Section 6.1.1 to Section 6.1.5 respectively. The study recommendations are presented in Section 6.2, followed by the research limitations and implications for future research presented in Section 6.3. The thesis concludes with final remarks in Section 6.4.

6.1 Research Findings

This section will address each of the following five subsidiary research questions:

1. What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling? (6.1.1)
2. What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study? (6.1.2)
3. What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area? (6.1.3)
4. What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements? (6.1.4)

5. What do UG lecturers from the health science discipline area require to support students for the DLE in UG study? (6.1.5)

6.1.1 Digital technology exposure and confidence

The first research question "*What are the perceptions of Yr13 students of their exposure to and confidence with using digital technology in their schooling?*" focused on the Yr13 biology students' perceptions of their exposure to and confidence with using digital technology in their secondary schooling. Unsurprisingly, the study revealed that overall, Yr13 students' self-perceived that they had a high level of digital confidence using digital technology. This was an expected finding due to the fact that the students attributed this confidence to their generation cohort and their high levels of digital exposure outside of the classroom (Dingli & Seychell, 2015). Nevertheless, there was a perception that secondary schooling did not support the development of their digital confidence as in-school access involved limited digital programmes that required a low level of digital knowledge and skills (Adjin-Tettey, 2020). As a result, there is a level of disinterest in teacher driven digital learning activities because, while there is a desire for the opportunity to develop their abilities in digital learning, the majority of their in-school digital exposure was limited to assessment related activities. From the student perspective, this led to the conclusion that the only preparation needed for UG studies was the digital preparation of their assessments, and as a result the majority of Yr13 research participants perceived that they are well prepared for UG studies.

Nonetheless, not all students were confident using digital technology for the purpose of learning and expressed feelings of unpreparedness for the upcoming transition into UG study. These feelings of unpreparedness were attributed to the limited availability of in-school digital exposure outside of assessment related activities (Adjin-Tettey, 2020). These students recognised they needed teacher support to help them learn how to confidently engage in digital learning opportunities. However, because of their high levels of out-of-class digital exposure, they perceived there was an expectation by their teachers that they intuitively knew how to engage with the available digital technology (Hasmawati et al., 2020;

Howard et al., 2016). This expectation had an impact on the level of digital support that was afforded by teachers.

Yr13 Students acknowledged that the classroom is becoming an increasingly digital space. This study revealed that they perceived they had been moved into a DLE without either sufficient preparation or a choice in how their learning was going to occur (Howard et al., 2016). The data showed that there continues to be a preference for a face-to-face teaching experience for students and a dislike of the digital mode of delivery. With the focus of teaching delivery in secondary school being highly structured, and continued to be delivered via a face-to-face teaching experience (Hassel & Ridout, 2018), students reported that, due to limited in-class digital exposure opportunities, they were unable to improve their levels of digital confidence. As a result, the students expressed a preference for using pen and paper, to annotate and highlight documents, study from workbooks and actively avoid using digital technology for learning purposes. In this context, it is worth noting here that during digitally focused learning opportunities students with digital skills concerns are more likely to use technology as a distraction tool in class rather than focus on the assigned learning activities (Bergdahl et al., 2019). Digital distractions were raised as an impactor on student digital confidence development. There was an indication in this study that students are not always able to remain on task and complete assigned digital learning requirements due to the presence of digital distractions.

6.1.2 Digital technology initiatives

To gain an understanding of the Yr13 biology students' perceptions of the digital technology initiatives at secondary school that are preparing them for using digital technology for learning in their first year of UG study the second research question investigated "*What were the perceptions of Yr13 students of the digital technology initiatives for preparing them for using digital technology for learning in their first year of UG study?*". The study revealed that a "Bring Your Own Device" (BYOD) policy was in place for the majority of students. While this policy is not specifically offered for preparation for the DLE in UG study, BYOD is also an important feature in the tertiary education sector. Parsons and

Adhikari (2016) identified one of the most important benefits of BYOD is the seamless connection between the classroom and home and this seamless connection is important for UG students. The impact of BYOD in education is that independent learning is enhanced and learning outside of the classroom is encouraged (IDCNZ, 2018). Both of these factors are essential for UG students to experience success in their studies. However, in this study Yr13 students reported access to BYOD was limited by teachers who preferred the traditional mode of teaching delivery. Access was also limited for students who did not have access to a school approved device and hence they were unable to fully participate in digital learning opportunities in the class. A finding that is supported by Adhikari et al. (2017).

This study also revealed that while there is an acknowledgement of the importance of digital technology to assist students to meet their learning needs, there was evidence of a lack of understanding from students regarding the learning opportunities that can be offered in the DLE. This included the perception that learning was not effective when delivered via a digital device. Throughout this study, students frequently referred to the internet when describing their digital learning activities, and that they used the internet mainly for assessments, research and to access course materials. There is a lack of recognition in the data that digital technology initiatives are occurring in the classroom that enable digital learning to occur, a finding that is supported by Costa et al.'s (2017) study on the United Kingdom university student experiences of digital learning. Unfamiliarity with digital terminology was a concern as students seemed unaware of the broad scope of digital learning. The students' narrow view that digital learning only occurs via the internet, implies the internet is the vehicle of digital learning (Pechenkina & Aeschliman, 2017).

The study further revealed that another factor that impacted on digital learning initiatives is the digital confidence of educators. Students indicated a reluctance to fully engage with digital technology unless they were already familiar with the technology in question, or if they perceived the digital technology as useful to their learning (Smith & Chipley, 2015). As such, they identified the need for an increased level of digital content to enable them to develop their digital skills, knowledge and strategies, while acknowledging that teachers need to be able to provide advice and guidance, as digital challenges arose (Bergdahl et al., 2019; Newton, 2018). When teachers were unable to provide this level of advice and guidance the result was that students were unable to complete learning activities. This perceived lack of support from their teachers led to students to have negative feelings toward digital learning. There is also the presence of a digital divide in this study, as not all students were able to participate in digital learning opportunities which had an impact on their ability to develop their digital confidence (Adhikari, 2018).

The study also revealed the presence of digital difference. While UG lecturers acknowledged the strengths of the DLE, students' perceived digital delivery was not the priority at secondary school, and there was a minimal amount of digital initiatives present. A factor impacting on the implementation of digital initiatives may be the ongoing infrastructure issues (Callo & Yazon, 2020; Tsitsia et al., 2020). From a student perspective, these issues were not addressed by their respective schools and impacted on their in-school digital exposure and their digital confidence. The identified issues included unreliable internet, which was slow to respond and resulted in students not being able to access the digital resources needed during class time (Office for Students, 2020). Digital difference was also evident where students did not have at-home internet access and were unable to undertake digital learning opportunities from home (Tsitsia et al., 2020).

UG lecturers proposed that future digital initiatives should include the development of an UG curriculum that is responsive to both student needs and the emerging digital technologies. They suggested that this curriculum redesign would need to include the concepts of digital citizenship, digital literacy and a complex range of digitally blended activities to encourage digital participation and increase digital confidence (Erstad & Voogt, 2018). While this would require significant investment from the NZ education sector, it would contribute to student preparedness for UG studies by providing focused digital support for students who are transitioning from secondary school into UG studies (Drake & Reid, 2020).

6.1.3 Digital technology experience

The third research question, "*What was first year UG students' experience of how Yr13 schooling prepared them for using digital technology in their UG studies in the health science discipline area?*" considered the experience of UG students' of their level of preparedness for UG DLE. Overall, the majority of UG students had had a high level of digital access at secondary school, and attended secondary schools with a BYOD policy in place. They attributed a high level of digital confidence with using digital technology to this exposure, and as a result of this confidence they found digital platforms in their UG studies easy to navigate (Burton et al., 2015). Nonetheless, there was also a small group of students who were not digitally confident with using digital technology when entering UG studies as they had had limited digital exposure at secondary school (Netsafe, 2015a).

However, even with a high level of digital exposure, all UG students in the study self-assessed a lower level of digital learning confidence. As with the Yr13 students, the main digital activity at secondary school was assessment related (Adeoye & Adeoye, 2017). As a result the UG students perceived they lacked the skills for digital learning and needed to develop their digital literacy in order to be able to effectively participate in digital learning opportunities. Another concern expressed by the UG students was the unfamiliarity with the LMS, and that there was more digital technology in their UG programme than they expected (Parkes et al., 2015).

The UG lecturers also acknowledged that they have experienced UG students who were not comfortable in the DLE. The study revealed that UG students anticipated a more traditional learning environment, apart from the accessing of class resources digitally (Respondek et al., 2017). They indicated their learning strategies were designed for a face-to-face teaching format and they were not ready to make the transition to a digitally focused teaching format. However, they stated that they were satisfied with the DLE; enjoying the convenience and flexibility that digital learning offers.

6.1.4 Preparedness for digital learning

To investigate the level of preparedness that educators expected from students for the UG DLE the fourth research question examined "*What level of preparedness for digital learning do health science UG lecturers expect from their students for UG study digital delivery requirements?"*

An expectation expressed by UG lecturers is that on entry to UG studies students are able to participate in digital learning opportunities. The UG lecturers acknowledged that the students require support for an effective transition from the structured learning environment of secondary school, to the self-regulated learning environment of the tertiary sector. However, they perceived it was the responsibility of the secondary school sector to ensure that digital learning is incorporated into the secondary school curriculum and that it is aligned to their academic expectations. A finding that is supported by Emerson et al. (2015a). What the UG lecturers in this study failed to acknowledge was the difference in the secondary and UG learning environments. According to Ainscough et al. (2017) this difference is due to UG students needing time to adjust to the learning environment and higher education academic expectations

The UG lecturers were of the view that Yr13 students are not confident in the DLE on entry to UG studies. They identified that the students did not possess the required skills, knowledge and strategies to prepare them for UG studies. To be better prepared, students must manage the digital learning distractions and demonstrate confidence, competence and independence (Anthonysamy et al., 2020). While the UG lecturers identified digital exclusion as the result of a lack of digital literacy development, this study also revealed a gap in educator knowledge. In this study, digital literacy was described primarily as a set of skills that students need in order to be prepared for the digital requirements of UG study (Adjin-Tettey, 2020). However, from the students' perspective, the study revealed that they are not provided the support to develop their confidence using digital technology for the purpose of learning. Their digital skills were largely self-taught in the out-of-school, social presence, context, and that they were expected to independently problem solve issues that impact on their digital learning experiences (Coldwell-Neilson, 2018). While the UG lecturers recognised that digital learning can be interrupted by new and evolving technology, ranging from software updates to the rapid expansion of digital technology available for learning, there was an expectation that, due the digital exposure opportunities available today, students are expected to be able to intuitively use digital technology to meet their learning needs (Howard et al., 2016). As a result students occasionally perceived being unsupported by their teachers when they were expected to navigate new and unfamiliar DLEs.

6.1.5 Support for digital learning

The fifth and final research question *“What do health science UG lecturers require to support students for the DLE in UG study?”* focused on the support educators require to support students in the UG DLE. The study revealed that there is a need for support for the educators themselves so that they can develop their digital confidence. While the UG lecturers in this study indicated that they were comfortable with their current level of digital ability, some were concerned that, without on-going professional development opportunities, they would not be able to successfully make the transition to new and emerging digital technology. Howard et al. (2019) further acknowledge educators’ confidence may be a barrier to the integration of digital technology in the DLE. UG lecturers recognised the need for professional development opportunities to enable them to have the knowledge to be able to fully engage with digital technology (Sun et al., 2018). The under-preparedness of UG lecturers to be able to fully utilise digital technology and facilitate digital learning opportunities to meet the digital expectations of their tertiary provider was present in the data. They perceived that from within the tertiary sector there is an expectation that they will seamlessly implement a redesigned digitally focused curriculum, with minimal employer provided professional development opportunities. To date, there have been instances where a lack of professional development opportunities has resulted in situations where a digitally focused knowledge gap emerged during teaching. As a way of dealing with these issues educators seek the support of their students in an attempt to resolve these issues (Cilliers, 2017).

The data suggests there is recognition by UG lecturers of the potential that digital learning opportunities offer to students. The importance of providing students with opportunities to develop their digital confidence would positively impact their ability to engage with digital technology (Yot-Domínguez & Marcelo, 2017). However, a concern was identified by students that educators do not always have the motivation needed to implement digital technology (Brooks & Pomerantz, 2017). Students reported that not all secondary school and UG educators wanted to implement a digitally focused curriculum (Madsen & Archard, 2018), and not all students wanted to participate in one (Yates et al., 2020). From the UG lecturer perspective this feeling of reluctance was due to the fact that the UG lecturers in this study were primarily self-taught. They had been provided limited formal professional development opportunities in the workplace and their digital preparedness had been developed through either a trial and error approach or their own experiences as distance students. Educators need continually access digital professional development opportunities so that they can continue to support their students learning in biology through the digital space (Ally, 2019).

The study also revealed a gap in the tertiary educator knowledge regarding the student digitally focused outcomes of the NZ Curriculum document. This finding was significant because UG lecturers perceive that students need to possess skills on entry to UG studies to be able to demonstrate the level of digital literacy required to be successful in the DLE (Emerson et al., 2015b). There is a failure to acknowledge that the NZ Curriculum is focused on digital literacy as being wider than skills and also incorporates the knowledge and strategies that are required to be able to fully participate in a digitally-enabled society (Netsafe, 2015a).

6.2 Recommendations

Digital confidence is essential in today's complex digitally focused education environment. Students need to possess high levels of digital skills, knowledge and strategies for the digital learning expectations of the tertiary sector (van Rooij et al., 2017a). The NCEA is the main national qualification for NZ secondary schools and literacy and numeracy is embedded into this qualification (NZQA, n.d.-b). Students who are transitioning from secondary school into UG studies must demonstrate that they have met a required level of numeracy and literacy to be eligible for entry into UG studies. While reading, writing and numeracy are essential skills that are embedded into the NZ Curriculum (NZQA, n.d.-b), digital literacy is a core requirement to be able to fully participate in the increasing presence of digital technology across the education sector. Students today need to have the skills, knowledge and strategies to be able to engage with current and emerging digital technology for the purpose of learning (Kizilcec et al., 2017). This effective and confident participation includes students demonstrating the ability to manage any digital distractions that may impact on their ability to participate in the DLE. The development of digital literacy strands into existing NCEA literacy and numeracy achievement standards (see Glossary for explanation) should be focused on the core aspects of participation, attitude, skills and knowledge from the Digital Citizenship framework (Netsafe, 2018) to improve the students confidence in the DLE. A method for embedding of digital literacy would enable the secondary schools to provide additional support for students to meet a minimum level of digital literacy, as currently occurs with numeracy and literacy assessments. However, while digital strategies are transferable across the sectors the embedding of digital literacy needs to be approached with a degree of caution. This study identified there is no basic set of digital skills and strategies or knowledge students can learn as digital fluency attainment is contextualised. Digital fluency development needs to be considered from both the life-long learning and exploratory learning perspectives which will enable the continued and parallel development of digital skills, knowledge and strategies for both educators and students. This focus will enable students who transition to the UG studies and the tertiary sector to have confidence first year UG students have met the minimum requirements to be able to confidently engage with and participate in digital learning opportunities.

In this study Yr13 and UG student experience in the DLE was variable and there were students from both groups who did not feel confident engaging with the digital technology for the specific purpose of learning. While recognising confidence is subject and self-defined, Park (2017) identifies student orientation in the digital environment is important to the development of digital confidence. Due to the contextual nature of digital fluency each sector, secondary and higher education, holds the responsibility to ensure students have the skills, strategies and knowledge needed to be successful in the DLE. Furthermore Abdous (2019) found first year UG students struggled to adjust to the university DLE and that a digital orientation course improved their confidence and preparedness for the digital learning experience. A view that is supported by Newton (2018) who recognises digital orientation for students who are unfamiliar with the digital technology is required to enable them to fully participate in their digital learning experience. UG students in this study, whose programme staff provided digital orientation for them in the first week of the programme, felt this helped them to navigate their degree programmes' digital environment. Orientation is designed to scaffold students abilities to develop strategies and improve their preparedness for their learning success (Liu, 2019). Context specific structured self-paced asynchronous digital orientation needs to be developed that provides students the opportunity to engage and participate in the DLE before they commence of their programme of study. This will allow students to develop their digital fluency for the specific purpose of learning and seek digitally focused support while providing the opportunity for them to critically reflect on the role of digital technology in their learning.

UG lecturers in this study acknowledge the possibilities offered by including digitally focused learning opportunities for students and the interruption new and emerging technology can have on student progress. However, the degree of digital learning opportunity integration in teaching is influenced by the educators' preparedness for digitally focused teaching (Brooks & Pomerantz, 2017). In the education sector today, with inquiry-based learning educators are the enablers, the sign-posts, to guide the students' learning. To be able to guide student learning in the digital environment educators, instead of focusing on student preparedness, need to ensure that they also focus on their own preparedness for the digital learning in a technology and media rich environment. Passey et al. (2018) claims, for example, that a basic level of digital technology knowledge is not sufficient to be able to support today's students. For the UG lecturers in this study, their professional development opportunities were limited and they wanted greater opportunities to develop their preparedness to deliver digital learning opportunities. Furthermore, students reported being requested by their teachers to assist with and resolve digitally related issues in the classroom. Newton (2018) similarly found that NZ teachers experience significant challenges in the development of their digital knowledge within the existing professional development models in NZ. He suggests that new models of professional development are needed to enable teachers to develop and sustain their digital preparedness. This may be the time for the NZ education sectors to consider adopting a professional development model that captures the complexity of the education environment, specifically a model that is focused on the implementation of a teacher knowledge framework for technology integration taking into consideration technology knowledge, pedagogical knowledge and content knowledge (TPACK) required to support the implementation of digital technologies into student learning experience (Mishra & Koehler, 2006).

UG lecturers in this study want there to be secondary-tertiary engagement to understand digital preparedness of students as they progress from secondary school to UG studies in NZ. At the local level, this would involve finding ways to bring secondary schools and tertiary institutions together to co-construct digital learning opportunities to support student digital preparedness for their post school pathways (Emerson et al., 2015a). For example, in this study, a UG lecturer indicated a preparedness to work with the secondary sector to support the progression of students from secondary school into UG studies. The NZ education system is designed for each level to provide the foundational knowledge that students require to successfully progress to the next level (MoE, 2019) . Educators need to confidently incorporate digitally focused learning opportunities into their teaching practice that will enable students, with guidance and support, to develop the strategies to be both digitally confident and prepared for UG study (Nortvig et al., 2018). Students in this study acknowledged the classroom is becoming an increasingly digital space and both secondary and tertiary educators need to take responsibility for designing digital learning opportunities that will develop the digital confidence of their respective students (Hunter, 2017). At a national level, the development of the curriculum across the NZ curriculum and UG programmes that are responsive to both student needs and the emerging digital technologies needs consideration. This development also needs to take into consideration the foundational digital skills, knowledge and strategies that are required for students to be confident and prepared for the DLE of UG study. The curriculum redesign would need to include the concepts of digital citizenship, digital literacy and digital technology integration in the classroom to incorporate a complex range of digitally blended activities to encourage digital participation and increase digital confidence (Erstad & Voogt, 2018). The High Possibility Classroom (HPC) Conceptual Framework could be considered as an option to enable the curriculum redesign and the seamless integration of digital technology into the learning environment (Hunter, 2017). This framework promotes "… the ways learning can be reimagined through innovative uses of [digital] technology to engage and motivate students" (University of Technology, 2020, para. 7) and support student learning in the DLE.

6.3 Limitations and Implications for Further Research

The findings from this study offer insight into the perceptions of the preparedness of Yr13 students for the digital expectations of the tertiary sector from three participant groups; Yr13 biology students, first year UG students in the health science disciplines and health science UG lecturers, across the secondary-tertiary sectors of the NZ education system. The main objective of this study was to explore the preparedness of Yr13 biology students for the self-regulated digital learning expectations of the NZ tertiary sector. While this objective has been achieved, the study was limited in the following areas.

One of the limitations of this study is self-evaluation bias. Self-evaluation bias is described by Zell et al. (2020) as the judgements that are made regarding an individual's "current abilities, attributes or traits" (p. 123) that are not informed by an objective lens. For example, in their study on measuring digital literacies Porat et al. (2018) found a gap between students' perception of their digital competencies and their actual performance. The Yr13 and UG students in this research had a high perception of their self-assessed digital confidence and they associated this with their digital exposure in the digital space. It is evident in the data that their confidence is related to the development of their digital fluency in their social presence. As a qualitative research approach was utilised for this study, the findings present a detailed account of the participants' understanding of the phenomena being studied. These findings are exclusively positioned with the context of the participants' constructed meanings and understanding (Creswell & Creswell, 2017). As this study was conducted with Yr13 and UG students and tertiary educators in NZ, it is reasonable to suggest the findings of this study could be varied in a different educational contexts. A future research opportunity could include a comparison of the students' perceived level of digital confidence and preparedness for UG studies and their level of confidence in their actual performance in the DLE.

The positioning of this study across the Yr13-first year UG student digital learning experience has focused on the student progression from a highly structured secondary school environment, into the first year UG flexible learning environment. The study is focused on a specific point in a student's educational journey and does not reflect how first year UG student's digital knowledge, skills, strategies and confidence are developed and refined as they engage with the UG DLE in preparation for the digital context of their graduate pathways. In 2020 these pathways included 21% of NZ Bachelor Degree graduates progressing to a higher level of study (Education Counts, 2022), where students would need to make the transition to the postgraduate (PG) DLE. Their preparedness for this learning environment would include the ability to self-regulate their learning experience at a level higher than what was expected in UG study. In this study there were both Yr13 and UG students indicating a preference for a face-to-face teaching experience. It is reasonable to suggest this preference may create challenges in the transition to PG study, especially if the expectation is access to educators in a non-LMS setting. However, in terms of this research, the focus on the experience of Yr13 and first year UG students was a conscious exclusionary decision made during the development of the research design. The purpose was to establish the parameters of the study (Miles, 2017), and while the PG context was not explored, it may be a consideration for future study.

In terms of how preparedness across the education DLE from Yr13 to UG and PG is framed, the impact COVID-19 pandemic on the NZ education sector needs to be considered. The data for this study was collected in a pre-COVID19 learning environment, before what Sharma and Alvi (2021) describe as “the shift in learning from traditional classroom learning to computer-based learning” (p.7016). During the pandemic there where periods of time where students enrolled in Level 2 and Level 3 of the NZ education system were required to transition to the DLE to engage in their learning. The notion of access to digital resources is changing, and the current expectation is that students are able to participate in the DLE. While Hossain et al. (2020) has identified students today have access to multiple devices, in a NZ study regarding the NZ education system’s response to the pandemic, digital equity for UG students remains a concern. Despite programmes and initiatives that are currently in place in NZ to address student digital inequity, students who are not able to engage in the DLE during the pandemic, due to the presence of digital poverty, remains a concern (Matear, 2021). Education Gazette Editors (2020) and Matear (2021) have further identified the pandemic exacerbated the presence of student digital inequity. This experience is consistent with international literature (Khlaif et al., 2021; Pittman et al., 2021) and the presence of an increasing level of digital inequity throughout the pandemic resulting in exclusion from the teaching and learning environment has been acknowledged by UNESCO (United Nations, 2020). This situation has been described by Hunia et al. (2020) as a two phase digital divide. The first divide occurs between those who have access to devices, internet connectivity, and digital skills, and those who do not have access. The second divide is when “access to complex and stimulating education resources online” (p.6) is limited with the presence of a device. Future research may focus on the two phases of the digital divide and the impact on student progression through the Netsafe Digital Citizenship Model (Netsafe, 2015a)

This study is positioned across the secondary–tertiary education sectors of NZ and another limitation of this study is the lack of Yr13 secondary school teacher perspectives to support the Yr13 student contributions. Although secondary school teachers had indicated interest in contributing to this research initially, they were subsequently unable to contribute to the data collection phase in either the AFG or individual interviews. Time availability as a reason for teachers not participating in research has also been noted in the current literature. For example, Nicholson and Lander (2020) identified time constraints as an impactor on educator engagement in research. The potential impact of time constraints on participant research engagement was a consideration in the AFG being employed as the data collection tool due to both the locality of the participants and that the AFG provides participants time flexibility in their contribution.

The selection of Moodle© as the research LMS was also a limitation of this research. This study was guided by Parkes et al. (2015) definition of preparedness. Preparedness is regarded as the behaviours that students need to be able to demonstrate to be digital learners and digital learning occurs through participation in a learning management system (LMS). Furthermore, Parkes et al. (2015) identified that pre-university exposure to LMS may have an impact on student preparedness for university digital environments. The purpose of the OLR in the present study was two-fold. Firstly, to provide frequency data of the preparedness behaviours demonstrated by the Yr13 students during their participation in the OLR. Secondly, to provide students with a digital learning experience to reflect on their level of confidence in navigating an OLR for the specific purpose of learning. Overall there were low participation rates with Moodle©. A possible reason for the low participation rates may be related to the majority of Yr13 students having not had experience with Moodle© prior to this research and they may not have felt confident participating in the LMS. However the exploration of the reasons for the low participation rates was beyond the scope of this study. Further study questions may be: Are there ways to support student participation with a LMS and provide strategies to improve student digital learning participation? What factors impact on student motivation to participate in digital learning? These factors may be related to the majority of Yr13 students having not had experience with Moodle© prior to this research. As explained in Chapter 5, Section 5.3 the unwillingness to participate in digitally facilitated learning could be related to a digital confidence issue (Bergdahl et al., 2019) and the students may not have been able to manage the digital learning opportunities contained in the LMS. In future research in student digital confidence utilising a LMS, a digital orientation may support the navigation of and participation in the digital environment prior to data collection.

Digital disengagement through digital distractions was identified in this study as factor that impacted on the development of both student digital confidence and preparedness for the transition to UG study. The exploration of the reasons for digital disengagement was not within the scope of this research. There is a research gap in this area and further research exploring the factors that lead to disengagement from the DLE would provide additional information concerning the nature of the disengagement and whether further support is needed for students in the area of digital literacy development to understand how to use digital technology for the purpose of learning.

6.4 Concluding Remarks

As an experienced UG lecturer, I had observed that the landscape of education in NZ has been undergoing a period of significant change over the last 20 years. This study grew from my observations over a number of years as a tertiary educator that NZ secondary school students did not seem to be able to fully participate in the DLE of the UG courses I facilitated. There were a number of concerns identified, such as digital access on and off campus which affected the students' ability to participating in the learning management system (LMS) activities, and the lack of digital skills and strategies to be able to access digital content for the purpose of learning. For some students, the presence of a digital device in the classroom was a distraction. They preferred to participate in digital activities not related to their learning such as virtual games and social media platforms. These activities affected the flow of session plans, which resulted in a reduction in the time available for teaching activities. I felt my role in the classroom had changed to being a digital negotiator, needing to constantly refocus students to the session content. The teaching strategies I was using were having limited effect as they seemed out of step with the students' digital abilities. I anecdotally observed that they appeared less able to adapt to the digital environment compared to the students who had had a break between their transitions from secondary school into tertiary studies. Secondary school students who transitioned directly into tertiary studies appeared to require a level of digital orientation and support to the learning management system and associated programmes. I also noted a high number of students were reluctant to access the email systems, as social media platforms are the preferred mode of communication. I found that my perception of students who had transitioned from secondary school, irrespective of their secondary schooling exposure to digital technologies or the presence of digital devices, was being challenged. In discussion with colleagues, I realised my experience was not an isolated phenomenon.

The main focus of this thesis was thus to determine the level of preparedness of Yr13 students for the DLE expectations of the tertiary sector. The literature and the study findings have demonstrated student preparedness is a diverse phenomenon that is influenced and defined by the experiences of the individual Yr13 and UG students and the educators who participated in this study. There are recognisable commonalities between the study participants, and there is a diversity of views evident regarding what constitutes preparedness for UG studies. Furthermore, the Yr13 students, as they had not yet experienced learning in the tertiary sector, determined their level of preparedness based on their level of digital exposure and their secondary school experiences. Understanding the Yr13 student digital learning experiences at secondary provides insight into the requirements of the NZ Curriculum. This insight will assist the tertiary sector to improve the scaffolding of students into an education experience that is significantly different from the highly structured secondary school environment. In addition, this research identifies the need for future research between the secondary and tertiary sectors if future students are to experience a seamless transition into UG studies.

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Appendices

Appendix A

Yr13 Biology Student Survey Questionnaire

School of Education Doctoral Project — Curtin University

RESEARCH STUDY

"Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand."

Researcher: Vicki-Lee Tyacke

SURVEY – Year 13 Biology Student

Participation in this research study is voluntary and you have the right to withdraw from participating in this study at any time without penalty.

I understand that my participation in in this study is confidential and that no material that could identify me personally will be used in any report on this study. I have read the study information sheet and I understand what participation means for me and I have had my questions answered to my satisfaction by the researcher.

The completion of this questionnaire implies my consent to participate.

This research project has been approved by the Curtin University Ethics Committee.
For more information regarding ethical conduct the Office of Research & Development

1. National Student Number:____________________________
2. Gender:
   - ☐ Female
   - ☐ Male
3. Please select the ethnic group, or groups, do you belong to:
   - ☐ New Zealand European
   - ☐ Māori
   - ☐ Pacifica:_________________
   - ☐ Asian: __________________
   - ☐ Middle Eastern/Latin American/African:_________________
   - ☐ Other: ______________________________
4. Are you enrolled in Year 13 Biology this year?
   - ☐ Yes – please continue to Q.5
   - ☐ No – Sorry but you do not meet the criteria for this survey. I sincerely thank you and appreciate your willingness to participate.

Year 13 Pre-survey Version 3 14/07/2016 — *Page 1 of 5*

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5. Please identify the types of digital technology that you use and the amount of time you would spend, on average, each week using digital technology.

Modes:	Amount of time, on average, each week using each mode (e.g. 5 hours)
Smartphone	
Computer/Laptop	
Tablet/iPad	
Game Console	
Other: Other:	

6. On the scale of 1-5 below ("1" being Very confident and "5" being not confident at all), how would you describe your confidence with digital technology?

Very Confident 1	2	3	4	Not Confident 5

Secondary Schooling

7. What type of secondary do you attend?

☐ Co-educational school – males and females attended

☐ Single sex school

8. Does your school have a "bring your own device" policy where you bring your own device to school for the purpose of learning?

☐ No - please continue to Q.9

☐ Yes

If you answered yes to this question

a. What type of device do you bring to school? ______________________

9. On the scale of 1-5 below ("1" being Very confident and "5" being not confident at all), how would you describe your confidence with using digital technology for your school work?

Very Confident 1	2	3	4	Not Confident 5

Please explain your confidence, providing examples if appropriate.

____

____

____

____

____

Digital Tools for Learning:

10. In the last week how many classes at school did you use a digital device for your school work?

Never	In a few classes	In most classes	In all classes

11. From the list below please select the digital tools you have used at school in the last week to complete your school work.

Desktop computers		Portable devices		YouTube	
Blackboard		Microsoft Office		Google Search	
Facebook		Moodle		Wikipedia	
Google Drive/Docs					

12. Do you have access to the internet at home?

☐ No – please continue to Q.13

☐ Yes

If you answered yes to this question, from the list below please select the digital tools you have used at home in the last week to complete your school work.

Desktop computers		Portable devices		YouTube	
Blackboard		Microsoft Office		Google Search	
Facebook		Moodle		Wikipedia	
Google Drive/Docs					

13. On the scale of 1-5 below ("1" being Very confident and "5" being not confident at all), how would you describe your confidence with using the following digital tools technology for your school work?

Digital Tools	Very Confident 1	2	3	4	Not Confident 5	Never used
Portable devices						
Desktop computers						
Blackboard						
Facebook						

Google Drive/Docs						
Google Search						
Microsoft Office						
Moodle						
Wikipedia						
YouTube						

14. As part of your Biology paper are you required to access resources and/or complete activities in an online learning system, e.g. Moodle, Blackboard, Strata

☐ No – please continue to Q.15

☐ Yes

If you answered yes to this question, in the last week which of the following activities have you completed?

Accessed a news forum		Accessed a biology resource		Completed a Google Search	
Read a forum post		Blogging		Took a quiz	
Posted in a forum		Read an article		Checked my grades	
Replied to a forum post		Watched a PowerPoint/slideshow		Worked on a group project online	
Submitted an assignment		Assessed your biology class Facebook page		Messaged my teacher	

15. What do you like about using the internet and digital devices for learning?

____

____

____

____

____

16. What don't you like about using the internet and digital devices for learning?

____

____

____

____

____

17. Please list any digital technology skills you would like to learn to help you with your school work?
    For example: how to create a PowerPoint or how to use Google more effectively.
    ____
    ____
    ____
    ____
    ____

<u>Additional Information:</u>

18. Are you planning to study at University next year
    ☐ No – please continue to Q.19
    ☐ Yes
    If you answered yes to this question, how do you expect to learn at University?
    ____
    ____
    ____
    ____
    ____

19. How do you expect to use digital technology in the future?
    ____
    ____
    ____
    ____
    ____

Thank you for your time in completing this survey.

Appendix B

Online Learning Resource Learning Plan

Session Activities

Researcher Guided Session

During this session the researcher will be circulating, providing support and logging questions from the participants.

Logon to the site	Participants will need to log onto the site and then self-enrol into the study page. Participants will follow the instructions on the Logon checklist and to protect their privacy they will be asked to use: • School email address • National Student number in the "first name" field and • 2016 in the "surname" field	Log on to e-platform Self-enrolment
Introduction	Short video welcoming them to the project introducing researcher, overview of the resource and availability of support.	
Reading	Participants will 1. Complete a short reading and in a Moodle forum write down a question they may have about the topic 2. Have the opportunity to use this to guide their investigations/activities during this session. 3. Be encouraged to review their peers entries and their posting will be revisited in the independent learning session	Forum posting Forum review
Video	Participants will view a video and 1. Answer questions. Questions will be inserted into the video using Zaption. 2. Using Mindmap software participants will create a concept map capturing the key concepts from the video. They will save the map as a PDF and upload their document into Moodle	Video embedded Quiz Access online software Create online concept map Assignment upload
Vocab	Crossword exercise of key terms. Participants will undertake a web search to find the answers to the clues	Online exercise Web searching
Conclusion	Independent learning activities will be discussed.	

Independent Learning Sessions

Session 1: **Resource database**	Time will be scheduled and researcher will be available to provide support to participants in this session.	Blue button Google search Resource database Resource review

	For this activity participants are going to create a resource database. Participants will need to: 1. Choose 3 key terms related to the topic 2. Complete a Google search and find a resource that meets the credibility checklist criteria 3. If the resource meets the credibility criteria, and is not already in the database, the participant will upload the resource along with their 3 key terms into the database. 4. If the resource is already in the database they will need to continue searching 5. Review one other posting – that has not yet been reviewed – and confirm it meets the credibility criteria. If the resource does not meet the credibility criteria the participants are to provide feedback outlining their decision.	
Session 2: **Review**	Researcher will not be available to provide support to participants in this session. Participants to revisit 1. The Resource Database and follow up any feedback they have received on their resource 2. Their posting from the “reading” section of this session plan and reflect on the learning that has occurred and reply to their original post whether or not they have found the answer to their question. Complete an open book test to end the study.	Resource review Reflective forum posting Online open book test

Appendix C

NCEA L3 Achievement Standard 91603

Number AS91603 **Version** 1 **Page** 1 of 2

Achievement Standard

Subject Reference	Biology 3.3
Title	Demonstrate understanding of the responses of plants and animals to their external environment

Level 3 **Credits** 5 **Assessment** External

Subfield Science

Domain Biology

Status	Registered	**Status date**	4 December 2012
Planned review date	31 December 2016	**Date version published**	4 December 2012

This achievement standard involves demonstrating understanding of the responses of plants and animals to their external environment.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Demonstrate understanding of the responses of plants and animals to their external environment.	• Demonstrate in-depth understanding of the responses of plants and animals to their external environment.	• Demonstrate comprehensive understanding of the responses of plants and animals to their external environment.

Explanatory Notes

1 This achievement standard is derived from *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007, Level 8 within the Science learning area. It is aligned with the following achievement objective from the Living World strand:

- Life processes, ecology and evolution, 'Understand the relationship between organisms and their environment'.

It is also related to the material in the *Teaching and Learning Guide for Biology*, Ministry of Education, 2010 at http://seniorsecondary.tki.org.nz.

2 *Demonstrate understanding* involves describing plant and animal responses to their external environment. The description includes:

- the process(es) within each response and/or the adaptive advantage provided for the organism in relation to its ecological niche.

Demonstrate in-depth understanding involves using biological ideas to explain:
- how the responses occur
- why the responses provide an adaptive advantage for the organism in relation to its ecological niche.

Demonstrate comprehensive understanding involves:
- linking biological ideas to explain why the responses provide an adaptive advantage for the organism in relation to its ecological niche. The linking of ideas may involve justifying, relating, evaluating, comparing and contrasting, and analysing.

3 *Responses* are selected from those relating to:
- orientation in space (tropisms, nastic responses, taxes, kineses, homing, migration)
- orientation in time (annual, daily, lunar, tidal rhythms)
- interspecific relationships (competition for resources, mutualism, exploitation including herbivory, predation, and parasitism)
- intraspecific relationships (competition for resources, territoriality, hierarchical behaviour, cooperative interactions, reproductive behaviours).

4 *External environment* will include both biotic and abiotic factors.

5 Assessment Specifications for this achievement standard can be accessed through the Biology Resources page found at www.nzqa.govt.nz/ncea/resources.

Replacement Information
This achievement standard replaced AS90716.

Quality Assurance

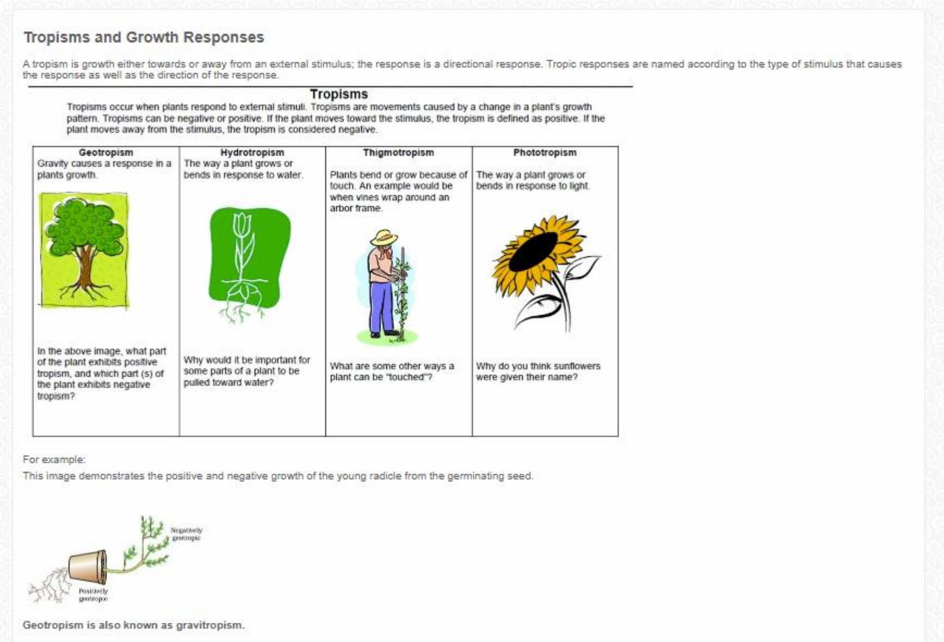
1 Providers and Industry Training Organisations must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.

2 Organisations with consent to assess and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference 0233

Appendix D

Online Learning Resource Topics Format Example



Tropisms and Growth Responses

A tropism is growth either towards or away from an external stimulus; the response is a directional response. Tropic responses are named according to the type of stimulus that causes the response as well as the direction of the response.

Tropisms

Tropisms occur when plants respond to external stimuli. Tropisms are movements caused by a change in a plant's growth pattern. Tropisms can be negative or positive. If the plant moves toward the stimulus, the tropism is defined as positive. If the plant moves away from the stimulus, the tropism is considered negative.

Geotropism	Hydrotropism	Thigmotropism	Phototropism
Gravity causes a response in a plants growth.	The way a plant grows or bends in response to water.	Plants bend or grow because of touch. An example would be when vines wrap around an arbor frame.	The way a plant grows or bends in response to light.
In the above image, what part of the plant exhibits positive tropism, and which part (s) of the plant exhibits negative tropism?	Why would it be important for some parts of a plant to be pulled toward water?	What are some other ways a plant can be "touched"?	Why do you think sunflowers were given their name?

For example:

This image demonstrates the positive and negative growth of the young radicle from the germinating seed.

Geotropism is also known as gravitropism.

This section focuses on tropisms and growth responses and has four activities for you to complete:

Watch the video and make sure you have a pen and paper handy to take notes on what you believe are the video's key concepts.

Search for concept map software on Google that will allow you to save your document as a PDF to your computer.

Using the concept map software, create a concept map that captures the key concepts from the video.

When you have completed and saved your concept map as a PDF you will need to submit the document here for grading.

Appendix E

Yr13 Biology Student Post Survey Questionnaire

School of Education Doctoral Project　　Curtin University

RESEARCH STUDY

"Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand."

Researcher: Vicki-Lee Tyacke

POST SURVEY – Year 13 Biology Student

Participation in this research study is voluntary and you have the right to withdraw from participating in this study at any time without penalty.

I understand that my participation in in this study is confidential and that no material that could identify me personally will be used in any report on this study. I have read the study information sheet and I understand what participation means for me and I have had my questions answered to my satisfaction by the researcher.

The completion of this questionnaire implies my consent to participate.

This research project has been approved by the Curtin University Ethics Committee.
For more information regarding ethical conduct the Office of Research & Development

1. Your Identification Number:________________________________

2. On the PhD Research Moodle page which of the following sections did you complete:

	Completed	Not Completed	Not attempted
Tropisms			
Tropisms & Growth Responses			
Tropism Vocabulary Exercise			
Scheduled Online Homework Session			
Independent Homework Session			

If you completed all the sections please go to Q.3

2. If you were not able to complete all the pages what factors may have affected your ability to do this

	Yes	No	Please explain if you answered yes
Internet/Broadband issues			
Access to the internet at home			
Digital device issues			

Year 13 Post-survey Version 2 16/05/17　　*Page 1 of 5*

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	Yes	No	Please explain if you answered yes
Access to digital devices at school and/or home			
The resource was not relevant to my learning			
There was not enough opportunities for interaction			
I didn't understand what I needed to do			
The course was difficult to navigate			
I did not have the time			
Other			

If you need more space to answer this question, please write in the Additional Comments section provided at the end of this survey

3. On the scale of 1-5 below ("1" being very confident and "5" being not confident at all), how would you describe your confidence with using the following digital tools?

Digital Tools	Very Confident 1	2	3	4	Not Confident 5	Never used
Moodle						
Google Search						
Forum posts						
Concept maps						
Submitting assessments						
Online crossword						
Resource database entry						
Open book test						

4. What did you like about this resource package?

____
____
____
____
____

5. What didn't you like about the resource package?

____
____
____
____
____

6. Thinking back to the first survey you completed, using the scale of 1-5 below ("1" being very confident and "5" being not confident) has there been a change in your confidence with using digital technology for your school work?

More Confident 1	2	No change 3	4	Less Confident 5

Please explain your response, providing examples if appropriate.

____
____
____
____
____

7. Please complete the following table:

Digital Tools	Strongly Agree 1	2	3	4	Strongly Disagree 5
Year 13 is preparing me for work and/or study in the digital environment					
I am required bring my own device to school					
I have a device that I can bring to school					
School provides access to "in-class" digital devices					

Digital Tools	Strongly Agree 1	2	3	4	Strongly Disagree 5
School provided "in-class" digital devices are reliable					

8. What do you plan to do when you leave school

   Enter full time study ☐

   Enter full time work ☐

   Do a 'GAP' year before studying ☐

   Travel ☐

   Other ______________

9. In your opinion, is school preparing you to use digital technology for work and/or study in the immediate future?

   Yes ☐ No ☐

   Please explain your answer:

   ____

   ____

   ____

   ____

   ____

10. On the scale of 1-5 below ("1" being very confident and "5" being not confident at all), how would you describe your confidence with digital technology for your future work and/or study plans?

Very Confident 1	2	3	4	Not Confident 5

11. Please list any digital technology skills you think you need to learn to help you with your intended 'after-school' plan

    ____

    ____

    ____

    ____

    ____

Thank you for your time in completing this survey.

Additional Comments:

Appendix F

First Year Tertiary Survey Questionnaire

School of Education Doctoral Project Curtin University

RESEARCH STUDY

"Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand."
Researcher: Vicki-Lee Tyacke

SURVEY – First Year Tertiary Study

Participation in this research study is voluntary and you have the right to withdraw from participating in this study at any time without penalty.

I understand that my participation in in this study is confidential and that no material that could identify me personally will be used in any report on this study. I have read the study information sheet and I understand what participation means for me and I have had my questions answered to my satisfaction by the researcher.

The completion of this questionnaire implies my consent to participate.

This research project has been approved by the Curtin University Ethics Committee.
For more information regarding ethical conduct please contact the Office of Research & Development

1. Programme of Study:____

2. Gender:

   ☐ Female

   ☐ Male

   ☐ __________

3. Please select the ethnic group, or groups, do you belong to:

   ☐ New Zealand European

   ☐ Māori

   ☐ Pacifica:____________________

   ☐ Asian: ____________________

   ☐ ____________________________________

4. Have you completed Year 13 Biology?

   ☐ Yes Year__________

   ☐ No - *Sorry but you do not meet the criteria for this survey. I sincerely thank you and appreciate your willingness to participate.*

5. Please identify the types of technology that you use and the amount of time you would spend, on average, each week using technology.

Modes: (e.g. smartphones, computes, tablets, etc...)	Amount of time, on average, each week using each mode (e.g. 5 hours)
Smartphone	
Computer/laptop	
Tablet/iPad	
Game Console	
Other:	
Other:	

6. On the scale of 1-5 below ("1" being very confident and "5" being not confident at all), how would you describe your confidence with technology prior to entering tertiary studies?

Very Confident 1	2	3	4	Not Confident 5

7. On the scale of 1-5 below ("1" being Very confident and "5" being not confident at all), how would you describe your confidence with using the internet for learning prior to entering tertiary studies?

Very Confident 1	2	3	4	Not Confident 5

Please explain your response (level of confidence), providing examples if appropriate.

____

____

____

____

____

Secondary Schooling

8. What type of secondary did you attend?

☐ Co-educational school – males and females attended

☐ Single sex school

☐ Public school

☐ Private school

9. Thinking back to your secondary schooling, what technology skills did you use that have been useful to your studies this year?

For example: accessing class resources online, completing online assessments, etc.

10. Did your school have a "bring your own device (BYOD)" policy where you took your own device to school for the purpose of learning?

☐ No – please continue to Q.11

☐ Yes

If you answered yes to this question:

a. What type of device did you take to school?

b. Please explain if this policy has had a positive impact on your studies this year.

Tertiary E-Learning Experience:

11. On the scale of 1-5 below ("1" being Very Easy and "5" being Very Difficult), how easy do you find your degree programme's online environment to navigate?

Very Easy 1	2	3	4	Very Difficult 5

Please explain your response (regarding navigating the online environment), providing examples if appropriate.

____
____
____
____
____
____
____

In your degree programme online environment:

a. What do you like about online learning? Please explain your response.

____
____
____
____
____
____

b. What don't you like about online learning? Please explain your response.

____
____
____
____
____
____

12. What technology skills have you needed to learn this year to be able to successfully engage with your programmes online learning components?

____

____

____

____

____

____

<u>Additional Information:</u>

13. What did you think learning in University would be like? Please describe.

____

____

____

____

____

____

14. Did you expect a lot of learning using digital technology?

☐ No

☐ Yes

15. Was there as much digital technology as you expected?

☐ No

☐ Yes

16. Is there anything else you would like to say about technology and how it has influenced your online learning experience:

____

____

____

____

____

____

Thank you for your time in completing this survey.

Appendix G

Asynchronous Focus Group Question Guide

Curtin University

School of Education Doctoral Project

Focus Group Question Guide

1. What do you understand to be "digital literacy"?
2. Let's explore what we think this statement means to NZ secondary and tertiary students. "Digital literacy is an essential skill all individuals must possess to be able to successfully contribute to a digital society".
    a. Should digital literacy be taught as a foundation subject alongside numeracy and literacy?
    b. Why/Why not?
3. Can you give an example of how you develop digital literacy for your students in your lessons?
4. How often would you use digital technology in the classroom?
    a. What enables the use of digital technology?
    b. Are there any barriers?
5. How confident are you using digital technology in the classroom?
    a. What professional development have you undertaken to support you to incorporate digital literacy in your teaching?
    b. If you have not done any professional development, how did you learn your digital skills?
6. How important do you consider the development of digital literacy to be for secondary school and tertiary students?
7. If we were to formalise digital literacy in the classroom, what are some of the digital competencies you think students need to be able to effectively and efficiently use digital technology for learning purposes?
8. What are your views on BYOD?
    a. Do you think it adds value to a student's educational experience?
    b. Would some families be financially disadvantaged if BYOD was compulsory?
    c. How would you recommend this could be avoided?

Focus Group Question Guide – V2, 14/07/2016 **Page 1 of 3**

Appendix H

Asynchronous Focus Group Participant Logon Instructions

Curtin University

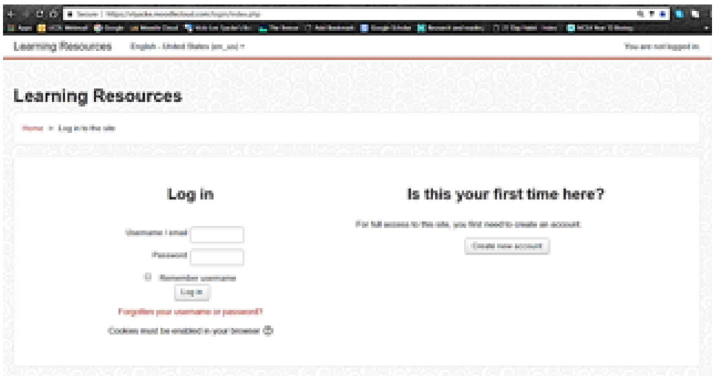
School of Education Doctoral Project

Moodle. School Logon Instructions

Project Title:	Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand.
Principal Investigator:	*Vicki-Lee Tyacke, Doctoral Student* *Curtin School of Education*

Logging onto the online resource

1. Go to **https://vtyacke.moodle.school**



2. Create a new account by completing the details
   a. User name: The number you used for the survey.
      - Eg. NSN number/phone number/birth date
   b. Email address: Enter your school email address as you need to be able to access this address now to logon for this class

3. Open the link sent to your email address and log onto the site. When you have successfully enrolled you will see the screen (dashboard) below.

Moodle.School Instructions Version 1, 03/05/2017 *Page 1 of 2*
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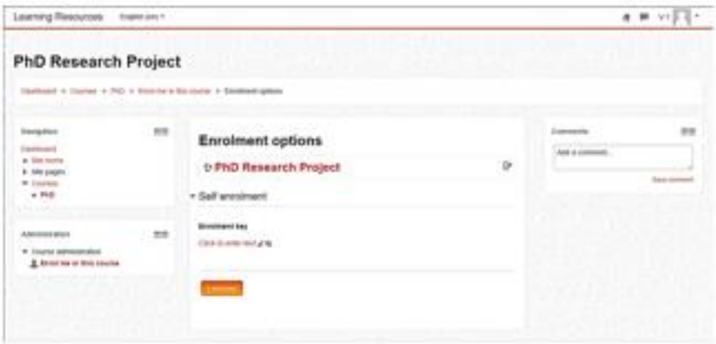
4. From the dashboard click **COURSES**

5. Select **PhD RESEARCH PROJECT**



6. Enter the enrolment key – **biology** – and click **ENROL ME**

Appendix I

Yr13 Student Data Set Data Analysis Example

Developing of the Yr13 Student Data Set Areas of Inquiry Development

Student learning

- After school plan
- OLR relevance
- Learner preferences
- Self-directed learning
- Assessment focused

Digital literacy

- Application knowledge
- Distractions
- Skills, knowledge, strategies
- Teacher guidance

Access

- Traditional/digital delivery
- Digital delivery
- Digital infrastructure
- Digital resources
- OLR relevance
- Teacher preferences

Confidence

- Digital exposure
- Generational cohort
- Access
- Motivation
- Attitude
- LMS exposure
- Assessment

Challenges

- Priorities
- Other commitments
- Distractions
- Digital entertainment
- Teacher knowledge

Preparation

- Learner progress
- Impact on learning
- LMS exposure
- Assessment
- Independent learning

Mapping of Theme One for the Yr13 Student Data Set

Familiarisation

Areas of Inquiry

Confidence with digital learning
Access to digital technology
Experience with digital learning
Digital literacy development
Student preferences

↓

Emerging Themes

1. Student confidence with digital learning
4. Access to digital learning opportunities
5. Digital challenges affecting digital learning participation
6. Educator preferences affecting digital learning participation

Constructing thematic framework

Thematic Headings with Index

Confidence
1.1 21st century students
1.2 Digital learning
1.3 Motivation to learn
1.4 Learning preferences
1.5 Digital literacy

Access
2.1 BYOD
2.2 Digital resources availability
2.3 Accessibility to digital learning
2.4 Digital infrastructure reliability
2.5 Digital delivery
2.6 Convenience

Challenges
3.1 Availability of digital entertainment
3.2 Priorities
3.3 Distractions
3.4 Impact of digital devices on learning
3.5 Attitude toward digital learning

Teacher
4.1 Teacher preferences
4.2 Teacher guidance
4.3 Assessment

Preparation
5.1 After school plan
5.2 Independent learning
5.3 Digital literacy
5.4 Digital exposure

Indexing

Data Extract

That the internet is not reliable, you can't circle, highlight, annotate, etc on questions and all of my work is not in the same space. Expensive to replace, fix or purchase devices

Index applied

Digital learning
Learning preferences
Digital access
Traditional vs digital

Charting

Transition preparation

1.2 Digital learning
4.3 Assessments
5.1 After school plan
5.2 Independent learning
5.4 Digital exposure

Digital learning challenges

1.3 Motivation to learn
2.3 Accessibility
3.1 Availability of digital entertainment
3.2 Priorities
3.3 Distractions
3.4 Impact of digital devices on learning
3.5 Attitude toward digital learning
4.1 Teacher preferences

Mapping and interpretation

Student preparation for tertiary studies
Transition pathways
4.3 Assessments as primary digital activity in school
5.1 Student progression to UG studies
5.2 School preparation for independent learning
5.4 Digital exposure at secondary school

Digital learning challenges
1.3 Motivation to learn
3.1 Availability of digital entertainment
3.2 Extracurricular priorities
3.3 Distractions
3.9 Impact of digital devices on learning

Appendix J

Curtin University Ethics Approval

Curtin University

Office of Research and Development

GPO Box U1987
Perth Western Australia 6845

Telephone +61 8 9266 7863
Facsimile +61 8 9266 3793
Web research.curtin.edu.au

08-Sep-2016

Name: Jennifer Howell
Department/School: School of Education
Email: Jennifer.Howell@curtin.edu.au

Dear Jennifer Howell

RE: Ethics approval
Approval number: HRE2016-0283

Thank you for submitting your application to the Human Research Ethics Office for the project **Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand**.

Your application was reviewed through the Curtin University low risk ethics review process.

The review outcome is: **Approved**.

Your proposal meets the requirements described in National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007)*.

Approval is granted for a period of one year from **08-Sep-2016** to **07-Sep-2017**. Continuation of approval will be granted on an annual basis following submission of an annual report.

Personnel authorised to work on this project:

Name	Role
Howell, Jennifer	Supervisor
Tyacke, Vicki-Lee	Student

Standard conditions of approval

1. Research must be conducted according to the approved proposal
2. Report in a timely manner anything that might warrant review of ethical approval of the project including:
   - proposed changes to the approved proposal or conduct of the study
   - unanticipated problems that might affect continued ethical acceptability of the project
   - major deviations from the approved proposal and/or regulatory guidelines
   - serious adverse events

3. Amendments to the proposal must be approved by the Human Research Ethics Office before they are implemented (except where an amendment is undertaken to eliminate an immediate risk to participants)
4. An annual progress report must be submitted to the Human Research Ethics Office on or before the anniversary of approval and a completion report submitted on completion of the project
5. Personnel working on this project must be adequately qualified by education, training and experience for their role, or supervised
6. Personnel must disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation, that bears on this project
7. Changes to personnel working on this project must be reported to the Human Research Ethics Office
8. Data and primary materials must be retained and stored in accordance with the Western Australian University Sector Disposal Authority (WAUSDA) and the Curtin University Research Data and Primary Materials policy
9. Where practicable, results of the research should be made available to the research participants in a timely and clear manner
10. Unless prohibited by contractual obligations, results of the research should be disseminated in a manner that will allow public scrutiny; the Human Research Ethics Office must be informed of any constraints on publication
11. Ethics approval is dependent upon ongoing compliance of the research with the Australian Code for the Responsible Conduct of Research, the National Statement on Ethical Conduct in Human Research, applicable legal requirements, and with Curtin University policies, procedures and governance requirements
12. The Human Research Ethics Office may conduct audits on a portion of approved projects.

Special Conditions of Approval

None

This letter constitutes ethical approval only. This project may not proceed until you have met all of the Curtin University research governance requirements.

Should you have any queries regarding consideration of your project, please contact the Ethics Support Officer for your faculty or the Ethics Office at hrec@curtin.edu.au or on 9266 2784.

Yours sincerely

Dr Catherine Gangell
Manager, Research Integrity

Appendix K

Yr13 Biology Student Information Sheet and Consent Form

Curtin University

School of Education Doctoral Project

YEAR 13 BIOLOGY STUDENT INFORMATION STATEMENT

Project Title:	Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand.
Principal Investigator:	*Vicki-Lee Tyacke, Doctoral Student* *Curtin School of Education*
Version Number:	*V3*
Version Date:	*11 July 2016*

What is the Project About?

- This project is about how Year 13 Biology Students use e-learning tools to complete their course requirements.
- The project is important as it will provide insight into what digital skills Year 13 students need to be able to successfully transition to online environment of degree level study.
- Year 13 Biology Students will be taking part in this project.

Who is doing the Research?

- The project is being conducted by Vicki-Lee Tyacke (Doctoral Student) from Curtin University, School of Education.
- There will be no costs to you and you will not be paid for participating in this project.

What will you have to do?

- If you agree to participate in this study you will be asked to complete:
    - A survey that has 20 questions and should take between 15-20 minutes to complete.
    - A NCEA Level 3 Biology topic study resource. This resource will be delivered in 2 parts. The first part will be a 60 minute online session facilitated by the researcher during school time. The second part of this study resource will be involve 30 minutes of homework using a computer.
    - An evaluation of your study resource. The evaluation has 20 questions and should take between 15-20 minutes to complete.
- The amount of time requirement for this project will be no more than 2hours.

Are there any benefits' to being in the research project?

- You will have access to a study resource for your NCEA Level 3 Biology examinations.
- You will gain experience of how digital technology can be implemented as a tertiary level study resource.

Are there any risks, side-effects, discomforts or inconveniences from being in the research project?

Apart from you giving up 90 minutes of class time and 30 minutes of your personal time I do not expect that there will be any risks or inconveniences associated with taking part in this study.

Who will have access to the data collected?

- Any information I collect will be treated as confidential and used only in this project unless otherwise specified. The following people will have access to the information I collect in this research: the research team and the Curtin University Ethics Committee.
- Electronic data will be password-protected and hard copy data (including paper-based materials and digital photographs or videos) will be kept in locked storage.
- The information collected in this study will be kept under secure conditions at Curtin University for 14 years after the research has ended and then it will be destroyed.
- You have the right to access, and request correction of your information in accordance with relevant privacy laws.
- The results of this research may be presented at conferences or published in professional journals. You will not be identified in any results that are published or presented.

Will you tell me the results of the research?

- I will write to your school at the end of the project. Results will not be individual but based on all the information I collected and reviewed as part of the research.

Do I have to take part in the research project?

- Taking part in a research project is voluntary. If you decide to take part and then change your mind, you can leave from the project at any time with no consequences. If you choose not to take part or start and then leave the study, it will not affect your relationship with the University, lecturers or your peers.

What happens next and who can I contact about the research?

- If you have any further questions, please contact me, Vicki-Lee Tyacke, on 027 688 4001 or by email vicki-lee.tyacke@postgrad.curtin.edu.au
- If you decide to participate, please sign the consent form. Your signature indicates your consent and that you understand the information you have been provided. Signing the consent indicates that you agree to be in the research project. Please take your time and ask any questions you have before you decide what to do. You will be given a copy of this information and the consent form to keep.

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number 2016-0283). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Appendix L

Yr13 Biology Teacher Information Statement

Curtin University

School of Education Doctoral Project

YEAR 13 BIOLOGY TEACHER INFORMATION STATEMENT

Project Title:	Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand.
Principal Investigator:	*Vicki-Lee Tyacke, Doctoral Student* *Curtin School of Education*
Version Number:	*V2*
Version Date:	*11 July 2016*

What is the Project About?

- Today's secondary school students are expected to transition to the tertiary sector and engage with e-learning platforms to achieve academic success in their degree level studies.
- Digital literacy has been globally acknowledged as an essential skill all individuals must possess to be able to successfully contribute to a digital society. In the New Zealand Education System digital literacy is not embedded in the NZ curriculum and is not a core requirement for the NZ University Entrance Qualification.
- This project seeks to explore the digital literacy of New Zealand secondary school students and their level of digital preparedness for tertiary studies

Who is doing the Research?

- The project is being conducted by Vicki-Lee Tyacke (Doctoral Student) from Curtin University, School of Education.
- There will be no costs to you and you will not be paid for participating in this project.

What will you have to do?

- If you agree to participate in this study you will be asked to participate in a focus group to explore the e-technology, independent learning skills and abilities you expect students to have mastered at the completion of their secondary education.
- You will be offered the opportunity to attend individual, semi-structured interviews if you were unable to attend the focus group session.
- Follow up interviews will be available if you would like the opportunity to discuss the content, or if the researcher needs further clarification of information shared.
- The amount of time requirement for this project will be no more than 90 minutes.

Are there any benefits' to being in the research project?

- You will have the opportunity to share your perceptions of the digital literacy skills you expect students to have mastered at the completion of Year 13.
- You will have the opportunity to network with Level 500 lecturers
- The outcomes of the project will be used to inform the facilitation of a smoother transition of students into the e-learning of tertiary study

Participant Information Form Version 2, 11/07/2016 *Page { PAGE * Arabic * MERGEFORMAT } of 2*

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Who will have access to the data collected?

- Any information I collect will be treated as confidential and used only in this project unless otherwise specified. The following people will have access to the information I collect in this research: the research team and the Curtin University Ethics Committee.
- Electronic data will be password-protected and hard copy data (including paper-based materials and digital photographs or videos) will be kept in locked storage.
- The information collected in this study will be kept under secure conditions at Curtin University for 14 years after the research has ended and then it will be destroyed.
- You have the right to access, and request correction of your information in accordance with relevant privacy laws.
- The results of this research may be presented at conferences or published in professional journals. You will not be identified in any results that are published or presented.

Will you tell me about the results of the research?

- I will write to your school at the end of the project and inform you that the results are available if you would like a copy. Results will not be individual but based on all the information I collected and reviewed as part of the research. At no time will you be identified or identifiable

Do I have to take part in the research project?

- Taking part in a research project is voluntary. If you decide to take part and then change your mind, you can leave from the project at any time with no consequences. If you choose not to take part or start and then leave the study, it will not affect your relationship with the University, your employer, your students or your peers.

What happens next and who can I contact about the research?

- If you have any further questions, please contact me, Vicki-Lee Tyacke, on 027 688 4001 or by email vicki-lee.tyacke@postgrad.curtin.edu.au

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number 2016/0283). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Appendix M

Degree Lecturer Information Statement

School of Education Doctoral Project

DEGREE LECTURER INFORMATION STATEMENT

Project Title:	Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand.
Principal Investigator:	*Vicki-Lee Tyacke, Doctoral Student* *Curtin School of Education*
Version Number:	*V3*
Version Date:	*11 July 2018*

What is the Project About?

- Today's secondary school students are expected to transition to the tertiary sector and engage with e-learning platforms to achieve academic success in their degree level studies.
- Digital literacy has been globally acknowledged as an essential skill all individuals must possess to be able to successfully contribute to a digital society. In the New Zealand Education System digital literacy is not embedded in the NZ curriculum and is not a core requirement for the NZ University Entrance Qualification.
- This project seeks to explore the digital literacy of New Zealand Level 500 students and their digital transition into tertiary studies

Who is doing the Research?

- The project is being conducted by Vicki-Lee Tyacke (Doctoral Student) from Curtin University, School of Education.
- There will be no costs to participants, and participants will not be paid for participating in this project.

What will you have to do?

- If you agree to participate in this study you will be asked to participate in a focus group to explore the e-technology, independent learning skills and abilities you expect secondary students to have mastered before they commence their tertiary studies
- You will be offered the opportunity to attend individual, semi-structured interviews if you were unable to attend the focus group sessions.
- Follow up interviews will be available after the focus group if you would like the opportunity to discuss the content, or if the researcher needs further clarification of information shared.
- The amount of time requirement for this project will be no more than 90 minutes.

Are there any benefits' to being in the research project?

- You will have the opportunity to share your perceptions of the digital literacy skills you expect students to have mastered on entry to tertiary studies.
- The outcomes of the project will be used to inform the facilitation of a smoother transition of students into the e-learning of tertiary study

Are there any risks, side-effects, discomforts or inconveniences from being in the research project?

- There are no anticipated risks associated with participation, however some feelings of stress may arise during the focus group. If this does occur, you are welcome to not contribute to any discussion that prompts such a reaction.
- The only identified inconvenience is the 90 minutes of time required to participate in the focus group.

Who will have access to the data collected?

- Any information I collect will be treated as confidential and used only in this project unless otherwise specified. The following people will have access to the information I collect in this research: the research team and the Curtin University Ethics Committee.
- Electronic data will be password-protected and hard copy data (including paper-based materials and digital photographs or videos) will be kept in locked storage.
- The information collected in this study will be kept under secure conditions at Curtin University for 14 years after the research has ended and then it will be destroyed.
- You have the right to access, and request correction of your information in accordance with relevant privacy laws.
- The results of this research may be presented at conferences or published in professional journals. You will not be identified in any results that are published or presented.

Will you tell me about the results of the research?

- I will write to your institution at the end of the project and inform you the results are available if you would like a copy. Results will not be individual but based on all the information I collected and reviewed as part of the research. At no time will you be identified or identifiable

Do I have to take part in the research project?

- Taking part in a research project is voluntary. If you decide to take part and then change your mind, you can leave from the project at any time with no consequences. If you choose not to take part or start and then leave the study, it will not affect your relationship with the University, your employer, your students or your peers.

What happens next and who can I contact about the research?

- If you have any further questions, please contact me, Vicki-Lee Tyacke, on 027 688 4001 or by email vicki-lee.tyacke@postgrad.curtin.edu.au
- If you decide to participate, please sign the consent form and scan and return it to me via email. Your signature indicates your consent and that you understand the information you have been provided. Signing the consent indicates that you agree to be in the research project. Please take your time and contact me if you have any questions before you decide what to do. You will be given a copy of this information and the consent form to keep.

Curtin University Human Research Ethics Committee (HREC) has approved this study. Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Appendix N

Participant Consent Form

CONSENT FORM

HREC Project Number:	HRE2016-0283
Project Title:	Self-regulated e-learning expectations: The transition into tertiary studies in New Zealand.
Principal Investigator:	*Vicki-Lee Tyacke, Doctoral Student* *Curtin School of Education*
Version Number:	*V1*
Version Date:	*18 May 2016*

- I have read information statement version listed above and I understand its contents.
- I believe I understand the purpose, extent and possible risks of my involvement in this project.
- I voluntarily consent to take part in this research project.
- I have had an opportunity to ask questions and I am satisfied with the answers I have received.
- I understand that this project has been approved by Curtin University Human Research Ethics Committee and will be carried out in line with the National Statement on Ethical Conduct in Human Research (2007).
- I understand I will receive a copy of this Information Statement and Consent Form.

Participant Name	
Participant Signature	
Date	

Declaration by researcher: I have supplied an Information Letter and Consent Form to the participant who has signed above, and believe that they understand the purpose, extent and possible risks of their involvement in this project.

Researcher Name	
Researcher Signature	
Date	