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The lived experience of undergraduate students using tablet devices

PRENDERGAST, TREVOR

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The Lived Experience of Undergraduate Students using Tablet Devices

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Trevor Prendergast

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Abstract

With the ever-increasing influence of technology on everyday life, the perceived need to integrate technology into education has never been greater. Contemporary research into education technology is predominantly teacher- or institute-driven, with equivocal evidence as to the efficacy of such technology. With the proliferation of personal devices, such as smartphones, tablets and laptops, an increasing number of studies focus on such devices in an effort to measure the impact on education. However, what appears to be missing from the literature is the impact of using tablet devices, framed within the concept of Bring Your Own Device (BYOD). In this context, learners are facilitated in utilising their personal devices through wireless connectivity, but such devices are not a requirement for the programme of study, nor are they supported in any way either from a pedagogical or technical perspective. This study aims to investigate the lived experience of students in higher education who utilise tablet devices of their own volition, both on- and off-campus, during their learning journey.

Acknowledgements

This journey I have undertaken would not have been possible without the support of many people, on an academic, professional and personal level.

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List of Abbreviations

BYOD – Bring your own device

CPD – Continuous Professional Development

GPS - Global Positioning System

HEI – Higher Education Institution

LMS – Learning Management System

SRL – Self-regulated Learning

SDL – Self-directed Learning

1　Introduction

1.1　Background

That technology has an influence on modern society is without question. Taking many forms, including smartphones, tablets and laptops, the ubiquitous connectivity and always-on nature of connected devices offers opportunities in education unavailable only a short time ago (Elliott-Dorans, 2018). In keeping with Moore's Law (Intel, 2015) the processing power of computing has doubled almost every two years to the extent that it is now possible to hold what was once considered a supercomputer in the palm of your hand. One manifestation of such computing power, the tablet, has found a place nestled nicely in between a laptop and a smartphone, offering a diverse range of features in a package roughly the size of an A4 sheet of paper. The year 2014 was considered the year that tablets came of age, with the Apple iPad (Apple, n.d.) firmly ensconced and devices from other manufacturers finally offering a wider choice for consumer (Gartner, 2014). It was not long before educators saw the potential of tablets. With its physical attributes comparable to a book or magazine, the relative ease of use, and crucially, the availability of software and content, it appeared that such devices could be readily used in an educational context. But the history of educational technology is littered with ideas that promised to revolutionise learning (Selwyn, 2017). From radio in the 1920s, television in the 1960s and microcomputers in the 1980s, each successive generation of technology was perceived as having the potential to transform the learning experience (Selwyn, 2017). Microcomputers in particular, with the capability to develop software aligned with the Behaviourist tradition offering drill-and-practice functionality for learning outcomes, promised a shift of focus in learning from the educator to the learner (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). But as I will discuss later, educational technologies, when exposed to the harsh realities of the classroom, do not always live up to the hype.

1.2　The Social Imperative of Educational Technology

The concept of the knowledge economy has increasingly become prevalent with technology playing an ever increasing role in this new type of society (van Laar, van Deursen, van Dijk, & de Haan, 2017). Therefore, the need for a digitally literate workforce, with the requisite technological skills and attitudes is apparent. But proficiency in the use of software applications should not be confused with the need for a broader ability to effectively harness the potential of this ubiquitous connectivity and collaborative opportunities that technology

provides. A new set of skills, the so-called 21st century skills such as critical thinking, problem solving and learning ability have a much greater influence on a person's ability to excel in the knowledge economy (Soulé & Warrick, 2015). Additionally, the risk of automation to manual jobs provides an added incentive for educational attainment and digital literacy (Arntz, Gregory, & Zierahn, 2016). It is therefore incumbent upon the education system to develop this additional literacy and to ensure that learners in compulsory- and post-compulsory education have sufficiently developed digital literacy that transcends social networking and office applications. There is extensive research in the literature detailing the use of technology at all levels in education (for example, see Livingstone, 2012; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). However, it is important to acknowledge the role of technology in education and the context within which it is situated. In particular, as the cost of personal technology devices decreases and availability increases, opportunities to use such devices in an educational context are presented that were unrealised only a short time ago.

As technology encroaches on almost all aspects of life, policy makers have reacted with various attempts to incorporate technology into compulsory education (Wellington, 2005, Selwyn, 1999). However, some research suggests that such efforts have been reduced to the learning of office applications (Wellington, 2005). Learners were instructed on use of such applications, suggesting that digital literacy was nothing more than a knowledge of how to use these applications. Such practices have resulted in a narrow and poor utilisation of technology, with many learners unable to effectively utilise other features, such as communication, collaboration and the creative side of computer technology (Voogt, Erstad, Dede, & Mishra, 2013). In an acknowledgement of such perceived shortfalls, recent updates to second-level curricula both in England and Ireland have attempted to address these issues, with emphasis on computational and algorithmic thinking at the forefront of the changes (Dept. for Education, 2013; Dept. of Education, 2018). At higher education, the integration of technology into pedagogical practice is as widespread and varied as the subjects studied. Ranging from the use of social media (Arteaga Sánchez, Cortijo, & Javed, 2014) to communication and collaboration tools (Maican, Cazan, Lixandroiu, & Dovleac, 2019) to laptops (Ragan, Jennings, Massey, & Doolittle, 2014), there appears to be a convincing case that technology has a role in higher education. But clarity around what that role is remains

elusive and the evidence as to the benefits of such technologies remains equivocal (Selwyn, 2016).

1.3   The Educational Technology Context

It is not only the role of the technologies that remains unclear, the very definition of educational technology also remains elusive (Livingstone, 2012). There are many strands in such a concept, including the physical device, the software that runs on the device, associated network connectivity, the actual learning material and the application of these to reinforce pedagogical practices. In one sense, technology is referred to as the computer, connected to a network and most likely to the internet, used for gathering and assembling information into knowledge (Henderson, Selwyn, & Aston, 2015). However, other uses of technology include bespoke software, created with the aim of facilitating pedagogical practices to facilitate learning, borrowing heavily from the Behaviourist tradition (Falloon, 2014). A key enabler and at the core of these activities is the programmable computer that was up until recently a beige box that sits on a table, with a screen, keyboard, mouse and network connection. In keeping Moore's Law alive, this computer technology has now developed to the point where devices have taken the form of smartphones, fitting into a shirt pocket or a handbag with the reported number of such devices worldwide exceeding 7.7 billion (ITU, 2018). In an educational context, particularly in higher education, laptops are a common sight in the lecture theatre, with their relatively long battery life, functionality comparable to a desktop and, arguably the most important, their portability (Gaudreau, Miranda, & Gareau, 2014). But the role of personal technologies such as laptops and smartphones in the educational context is unclear, the role of tablets even less so. When such technologies are used in institute-led programmes, the role becomes clearer, but conclusively measuring impact remains somewhat elusive (Carter, Greenberg, & Walker, 2017). The literature is awash with examples of research using laptops, smartphones and tablets that, on the face of it, appear to suggest an interest in the use of such technologies by educators and almost unlimited opportunities to enhance the learning experience (for example, see Nguyen, Barton, & Nguyen, 2015; Van Der Ventel et al., 2016; Wardley & Mang, 2016). But drilling down into the detail of such research reveals a number of characteristics that appear to be relatively common when investigating the impact of personal technologies in education. Firstly, the use of technology is almost always mandated by the institution or staff of the institution. To elicit reliable results, a

methodologically robust experiment design is commonly utilised, which includes the use of known technologies, the context within which they are used and a robust pedagogical framework in which to use such technologies. Secondly, the vast majority of research is instructor-driven, with enthusiastic and committed educators seeing personal technologies as having the potential to positively impact the learning environment. Typically, such instructors, whether they are at compulsory- or post-compulsory education, are from the social constructivist viewpoint and have an avid interest in technology themselves (Mueller, Wood, Willoughby, Ross, & Specht, 2008). Thirdly, the impact of technology on the learning environment is notably difficult to determine and almost entirely context dependent.

There are two key aspects to technology in education - a system central to the pedagogical constructs of a learning session (for examples, see Van Der Ventel et al., 2016; Crompton & Burke, 2018; Stamm, Triller, Hohoff, & Blanck-Lubarsch, 2019) and an information gathering, management and communication tool (Henderson et al., 2015). In both cases, learning is facilitated with the technology, with the technology being nothing more than a tool (Elphick, 2018). When used as a learning mechanism, technology can, and usually does, take the form of software written to develop key learning outcomes in domains such as literacy, mathematics or a language (Pimmer, Mateescu, & Gröhbiel, 2016). The multimedia features of modern computers, and in particular tablets, enhance the learning, bringing to life text, supplementing it with audio, video and animations (Jamet, 2014). Yet promises of technology to revolutionise learning have not been realised (Sanders & George, 2017). It would appear that despite the rapid growth availability and functionality of such technology, the learning environment not changed from its industrial-era roots. Tyack and Tobin suggest that what they call the grammar of schooling is proving particularly difficult to change (Tyack & Tobin, 1994), a point I will return to in Chapter 2.

When used as an information gathering tool, technology facilitates the searching, consolidation, management and communication of information which, it is hoped, will form the basis of learning (Henderson et al., 2015). Add in communication and collaborative functionalities of personal technologies and the potential for situated learning combined with collaborative learning suggest strong potential for a new kind of learning, incorporating the much-vaunted 21st Century skills (Voogt, Erstad, et al., 2013; Joke Voogt & Roblin, 2012). But the evidence to suggest this kind of learning occurs is particularly scarce. So therefore, it

warrants investigation to see if there is evidence to suggest that tablets do in fact offer new opportunities for learning, collaboration and development of 21st century skills, particularly within to context of learners who purchase the devices of their own volition and use them outside of a formal learning environment. Furthermore, these skills that can be explicitly taught, do not always translate into profitable use of the technologies. As I will explore in Chapter 2, evidence would suggest the concept of the tech-savvy student is prevalent, with fears from educators at all levels that students will exhibit superior technical skills, thereby undermining the authority of the educator. The contrast between digital skills and digital literacy has been described as a difference between skills of the hand and skills of the mind (Breslow, 2015) and is particularly noteworthy for the use of personal technologies as a lot of commentators suggest that learning with such devices is still only at the embryonic stage (e.g. see Nguyen et al., 2015; Kaliisa, Palmer, & Miller, 2019).

1.4   Personal Technologies

Various efforts have been made to incorporate personal technologies such as laptops and smartphones into the learning environment. One-to-one laptop initiatives in schools have met with mixed results, with research suggesting that when success was measured as an improvement in assessment scores, the results were predicated on a significant number of factors including teacher beliefs on the benefits of technologies and the subject being taught (Howard, Chan, & Caputi, 2015). Other studies suggest laptop use in classrooms appear to blend in with current practice, missing any opportunities to transform the learning environment (Selwyn, Nemorin, Bulfin, & Johnson, 2017). In higher education, smartphones have been successfully used to facilitate engagement and to provide opportunities to capture information outside of formal learning environments (Gikas & Grant, 2013; Sundgren, 2017; Crompton & Burke, 2018). This kind of informal learning, where learning is not directed by an instructor, provides new and engaging opportunities, shifting the control of learning from the educator to the learner. But as Gikas & Grant (2013) suggest, success of such initiatives is still predicated on the willingness of the educator to lead initiatives and provide these rich learning opportunities. Laptops in higher education appear to straddle two distinct types of use. The first is where the devices are loaned to students by the institution as part of a formal programme of learning, typically only for the duration of the class and only as part of the research. Research suggest that such programmes have met with success (e.g. see Bell & Glen,

2008; Carter et al., 2017; Keppler et al., 2014) and that educators see the benefit of incorporating laptops into their teaching practices. The second type of use of laptops is when students purchase the devices of their own volition and utilise them at various times during learning, most notably in the lecture theatre. It is in this context where there is a significant body of research suggesting the negative impact laptops have on learning (e.g. see Ravizza, Hambrick, & Fenn, 2014; Ravizza, Uitvlugt, & Fenn, 2017; Gaudreau et al., 2014). The findings suggest that not only are laptops detrimental to learning, but there is also evidence to suggest using a laptop in a lecture theatre also serves as a distraction to those in the vicinity of the laptop user, with students struggling to maintain focus on a lecture while another laptop screen is in their field of vision (Sana, Weston, & Cepeda, 2013). Functionally, tablet devices offer relatively similar capabilities to laptops, with some models offering keyboards as an add-on suggesting that conceptually, they are no different to laptops. What is not clear from the literature is whether or not tablet devices offer the same level of distractions to users in the vicinity. Furthermore, the broader question around undergraduate students using tablets within the lecture theatre and off-campus remains under-researched.

1.5   Bring Your Own Device

In higher education, the ubiquity of personal technologies has given rise to the concept of "Bring Your Own Device" (BYOD) (Chou, Chang, & Lin, 2017; Song & Siu, 2017). Such concepts are almost always broken into two distinct forms of BYOD – the relatively common provision of wireless network access at most locations across the campus, with little or no technical support being offered, to initiatives that mandate students bring their devices that are subsequently utilised at many stages in the learning experience. However, learning still is considered to occupy the twin domains of the campus and the student home, with little consideration being given to what Hedin calls "opportunistic learning" (Hedin, 2014 quoted in Sundgren, 2017). The blurring of boundaries and time appears to be facilitated by ubiquitous wireless connectivity and relatively affordable personal technologies. But there appears to be very little in the literature on the student experience, particularly outside of an institute-led programme (Gillies, 2016).

1.6   Tablets

The question therefore arises as to where tablet devices fit into this landscape. There is significant research on personal technologies in an educational context, in more recent times,

laptops and smartphones (e.g. see Bell & Glen, 2008; Gikas & Grant, 2013; Ragan, Jennings, Massey, & Doolittle, 2014). Given that tablet devices are a relatively recent manifestation of a computing device, there is limited research on tablets usage in higher education. What research there is, typically focusses on limited studies with a narrow focus in what Dede (2012) calls "boutique interventions". In higher education, there appears to be even less research in this area, with some studies finding that tablets are used as purely time management and organisational devices, potentially missing out on the significant functionality and opportunities for collaborative learning (Selwyn, 2016). Other studies in higher education tend to be limited in scope and focus, best described as exploratory (Wardley & Mang, 2016). In some cases, research has even found that students learning with technologies other than tablets actually perform better than a comparable group learning with tablets (Martin & Ertzberger, 2013). What these examples suggest is that given the fact that tablet devices are relatively new to the market, digital pedagogies and opportunities to incorporate tablets into the curriculum are yet to be realised.

1.7   Aims and Objectives

An often neglected aspect of educational technology research is the student voice, usually limited to surveys or end of semester questionnaires, based on classroom experiences in defined contexts (Hämäläinen, Kiili, & Smith, 2017). The focus on learning with personal technologies such as tablet devices inside the classroom or lecture theatre neglects an emerging and important concept of opportunistic learning that takes place outside of such environments (Sundgren, 2017). This type of informal learning, enabled by the portability of tablet devices in conjunction with longer battery life and ubiquitous network connectivity, facilitates what Martin & Ertzberger (2013) suggest consists of authentic activities, framed within the context of formal learning. The aim of this investigation, therefore, is to explore the lived experiences of undergraduate students using tablet devices, ensuring that use outside of campus is afforded the same prominence as use on campus. The study takes a purposely device-agnostic stance, ensuring the focus is on the student and the context within which she uses the device, rather than the make, model or features of the device.

1.8   Research Design

The intention of this study is to investigate what undergraduate students use their tablet devices for, where they use them and what part the devices play in the learning experience,

both formal and informal. Acknowledging that a key feature of tablet devices is portability, the intention of the investigation was to consider student use both on- and off-campus, academic- and non-academic use. Given the need to extract rich data on the subjective student experience, it was clear that methodologies in the Positivist tradition were not suited to a study of this type and that an Interpretivist paradigm was necessary. When condensed down to the phenomenon of tablet use within the context of the lived experience, it became apparent that Phenomenology offered a suitable methodology to undertake this research.

Phenomenology seeks to elicit the meaning of a phenomenon, based on prereflective and subjective experience (van Manen, 2014). Originating from the work of Edmund Husserl, Phenomenology seeks to elicit the underlying essence of human experience to seek meaning (Giorgi, 1994) Using this methodology, participants were asked to recount their own experiences of using tablet devices during their time as an undergraduate student, in an effort to elicit an understanding of what is means to be an undergraduate student that uses a tablet device.

With that in mind, the research question has been defined thus:

What is the lived experience of an undergraduate student using a tablet device?

For the purpose of this study, a tablet device has been defined as follows:

A handheld touchscreen device, with a screen size greater than seven inches, with network connectivity, the primary purpose of which is other than making phone calls.

In line with the phenomenological philosophy, participants are required to have a meaningful experience of the phenomena under investigation (Van Manen, 2014). In the present study, participants were required to be registered undergraduate students and have owned and used a device for at least one academic semester (16 weeks) prior to participating in the research. No conditions were put on tablet use outside of the campus environment, as it was anticipated that this would form a key strand of the investigation. For the purposes of this study, on-campus use was considered as the use of the personal device anywhere within the confines of the campus, such as a lecture theatre, cafeteria, library. Anticipating use up to the immediate vicinity of the campus, such as when as student might take public transport, off-campus use is broadly defined as outside the campus grounds, irrespective of how close to

the campus that use occurs. Acknowledging Venkatesh's concept of hedonic motivation for the purchase and use of consumer technologies (Venkatesh, Thong, & Xu, 2012), the delineation is relevant as it was anticipated that the device would be use for non-academic purposes in addition to academic purposes.

1.9   The Contribution of this Study

As I have outlined in section 1.2, there is a substantive body of literature investigating the broad impact of technology in education. However, while there is ample evidence of the use of personal technologies to enhance the learning environment, any evidence of the success or otherwise of tablet devices appears to be firmly in the realm of institute-mandated programmes, where the devices are provided by the institution, usually on a temporary loan basis. While the student experience with personal technologies is typically captured using techniques such as group interviews (Butcher, 2016) comparison with end of semester assessment results (Elliott-Dorans, 2018), observations (Carter et al., 2017) or a combination of surveys and comparison to end of semester results (Stamm et al., 2019), there appears to be very little affordance given to the individual student voice.

What is even less apparent in the literature is the use of tablet devices outside of the confines of the campus. Given the physical attributes of tablet devices, in addition to the extensive battery life, use is no longer confined to the vicinity of a power supply and therefore may provide opportunities to engage in informal learning at a time and location chosen by the student. Furthermore, with the emergence of BYOD, the majority of research in this area appears to centre around smartphones (Crompton & Burke, 2018) and laptops (Kay & Lauricella, 2016). This study therefore contributes to the body of knowledge in two under-researched areas:

- – tablet use in higher education by undergraduate students who utilise devices outside of a formal institute-led programme and
- – tablet use by undergraduate students outside of formal learning environments

1.10 Structure

This thesis is structured around five chapters.

Chapter one is this introductory chapter, outlining the case for the research and setting the context.

Chapter two explores the literature under four key themes. The first is the context of technology in education. The literature is awash with examples of technologies that were promised to be next big thing in learning, only to succumb to what Selwyn calls "the harsh realities of the classroom" (Selwyn, 2017). This chapter explores digital technologies and how they lived up to the expectations of the various stakeholders and offers one strand in the historical context of where tablets are situated in the landscape of learning. The second theme explored are the so-called 21st century skills that educators and industry believe to be critical for the workforce of the future. A discussion is presented of these skills and how they go far beyond simply knowing how to use a computer or applications such as office software and social media software, but more importantly, why they are considered so critical for the worker of the future. The third section of the literature review explores student conceptions of learning and study, asking where technology fits into this environment and a whether it is a key enabler of learning. The literature has many examples of where technology has had limited, or at least ambiguous impact on learning, this section offers a discussion as to why this may have occurred and what is important to successfully implement a digital pedagogy. The final section of the literature review sets the final strand of the context for the study by examining the personal computing devices that precede the tablet and contrasting the various aspects of each and why they are relevant to the discussion of tablet devices.

Chapter three explores the options that were considered for investigating the research question and in particular, why Phenomenology was chosen. It discusses the approach to the research, the design and the methodology. Chapter four details the findings, including analysis and interpretation of the findings.

Chapter five concludes with a discussion of the findings, in particular what it means to be a student in a higher education institution using a tablet device and offers some suggestions for further research. The chapter will be framed in the context of the Unified Theory of Acceptance and Usage of Technology 2 (UTAUAT2) providing a robust theoretical framework for the discussion of the findings (Venkatesh et al., 2012). This chapter will conclude with a reflection on whether tablet devices are in fact a new and exciting development in the field of educational technology or whether they are just another example of a technology with potential that can only be realised with substantial changes to the delivery and conceptualisation of learning at higher education.

2 Literature Review

2.1 Introduction

This literature review examines the context within which the study is situated, exploring the nature of technology in education. Through this discussion, I intend to explore how the educational technology landscape has evolved and how we have arrived at the situation where it is increasingly considered normal for learners to engage in the concept of Bring Your Own Device (BYOD) (Song & Siu, 2017). Acknowledging that education is a complex social environment with many actors, the use of such technologies is explored from a number of different perspectives, including the societal, vocational, from the perspective of educational administrators and managers, teachers and the learners themselves. The field of educational technology is not only broad, but also has a significant history, with some commentators suggesting it defies coherent and consistent definition (Livingstone, 2012; Selwyn, 2017). In an effort to articulate the context and draw parallels, educational technologies will be explored at compulsory (primary and secondary) and post-compulsory (higher and further education) level, acknowledging that educators and students at all levels encounter broadly similar experiences and face common issues.

Debate in the literature rages as to the equivocal empirical evidence of the benefit of educational technologies, whatever form they take (McKnight et al., 2016; Tamim et al., 2011), yet educational administrators, managers and policy makers appear to be unquestioningly supportive of educational technologies. Why this is so, is not clear, but some suggestions are offered in the literature. Throughout this discussion of educational technologies, there does appear to be a notable gap in the literature – that of the student perspective. Outside of formal, institute-driven, instructor-led technology implementation initiatives, there appears to be a paucity of literature on students engaging in the concept of BYOD with tablet devices. This study will focus on students who utilise personal technologies, specifically tablets, of their own volition and explore how these devices contribute to the learning experience, both on- an off-campus. From this a concept of what it means to be a student at higher education will be developed, with particular focus on such students.

The chapter opens with an exploration of the history of educational technology, acknowledging what Selwyn (2017) refers to as older "analogue" technologies and focussing primarily on more contemporary digital technologies and their application. Recent focus on the need for the embedding of the so-called 21st Century Skills into education will be explored, drawing comparisons with the skills that were required in the 19th century during the Industrial Revolution while suggesting that the two are not necessarily that different. Discussion then moves on to examine why the structure, administration and delivery of education has remained remarkably similar to industrial-era education, despite all the advances in technology. Technology implementation from a teacher's perspective is considered, acknowledging the often-hidden challenges and issues they face effectively integrating technology into their pedagogy, while questioning why the focus is almost entirely on teachers and educators, with very little research being undertaken on the student experience with technology, even less so with tablets.

The chapter finishes up with examples of contemporary technology of relevance to this study – personal devices, such as laptops, smartphones and tablet devices, discussing how they have been incorporated into the learning environment, not only by educators, but in particular by learners themselves. These learners, more notably in higher education, appear to see the value in personal devices, with laptops in particular a common sight in lecture theatre. This is despite the substantial body of evidence suggesting that using such devices in the lecture theatre is not only detrimental to their own learning, but also to fellow students in the vicinity (Sana et al., 2013). Research using other personal technologies, including smartphones and tablets is discussed in an effort to provide a context for the present study.

2.2   The Social Imperative of Educational Technology

It would be unusual to question why traditional industries such as financial services and airlines use computer technology to the extent they do. Such industries have not only embraced technology, but their very operation would be significantly more onerous were it not for the labour-saving features of computers, software, networks and storage technologies. It was inevitable, therefore that societal and economic demands in respect of computer literacy would permeate into education, giving rise to what some commentators suggest is the social imperative of educational technology and associated digital skills (van Laar et al., 2017) But such demands place inordinate amount of strain on already stretched

resources. Supporting and maintaining suitable technology infrastructure is costly, not only in financial terms, but also in other areas such as support, maintenance and training. As I will explore later in section 2.11, simply providing technology to educators is insufficient to ensure it is effectively used. Providing proper training, in the form of Continuous Professional Development (CPD) is critical to the success of such initiatives (Hammond, 2014). And even when such initiatives are well resourced and planned, there is always the possibility of the learner being more proficient in the technology than the educator, risking loss of status and challenging perceptions of teacher self-efficacy (Orlando, 2014b). But it is widely acknowledged that technology has a place in education. What that place is generates significant debate in the literature. It is to this, I now turn.

2.3   Digital Technology

Educational Technology can be broadly broken down into two, categories – older analogue technologies that were once heralded as useful to learning such as radio, television, the phonograph and film; and digital technologies such as the computer, the network, databases, the internet and software systems such as learning management systems and social media (Selwyn, 2017). Digital technologies comprise of the hardware, software and systems that are now increasingly becoming an integral part of the educational landscape. From desktop computers to smartphones, and the associated networking functionality, they all share a common ancestry. But ever since affordable microcomputers began appearing in classrooms around the mid-1980s (Tamim, Bernard, Borokhvoski, Abrami, & Schmid, 2011), there has been significant debate as to the contribution such technology has made to education. Quantifying the effect technology has on learning proves almost as problematic as actually defining what technology in education is, particularly when technology is generally perceived as a positive influence on education (Sanders & George, 2017). Such beliefs neatly skirt around the potential pitfalls of implementation of technology in the learning environment (McKnight et al., 2016). Tallvid (2014) reports on a one laptop per student initiative and illuminates a number of findings that expose the reality of such initiatives in the classroom. Teachers reported a lack of technical competence when using the laptops, in particular feeling the net benefit on their pedagogical practices and resultant impact on student learning was not worth the effort. Selwyn et al., (2017) note that a broad instruction for second-level students to bring their own devices went from being an invitation to a directive. Both studies

comment on efforts to retain student attention during class, resulting in increasingly rigid rules on when and how devices can be used. Selwyn et al go one step further to comment on a particular example of successful and positively-viewed use of personal technologies in the classroom, not for the success of the instance, but rather because it was the exception to the rule (Selwyn et al., 2017). At higher education, commentators such as Shelton (2017) describe a series of examples where the shift to digital technologies was often undertaken without consultation and therefore resulted in disenfranchisement and hostility to these new technologies. Other research suggests a frustration with technologies, with poorly performing wireless access for personal devices as a particularly common issue, severely impacting the progress of teaching sessions (Song & Siu, 2017). It appears that just as there is empirical evidence to support the positive integration of technology into pedagogical practices, there appears to be an almost equal volume of empirical evidence to suggest that the implementation of technology into the classroom is not as straightforward as might be expected. Why this might be so, I now explore.

2.4   The Educational Technology Cycle

The almost overwhelmingly positive perception of educational technology can prove particularly problematic for those on the front line who have to implement policies developed by those far removed from the classroom (Sanders & George, 2017). Educational technologies typically go through a cycle such as that depicted in Figure 2.4-1 below.
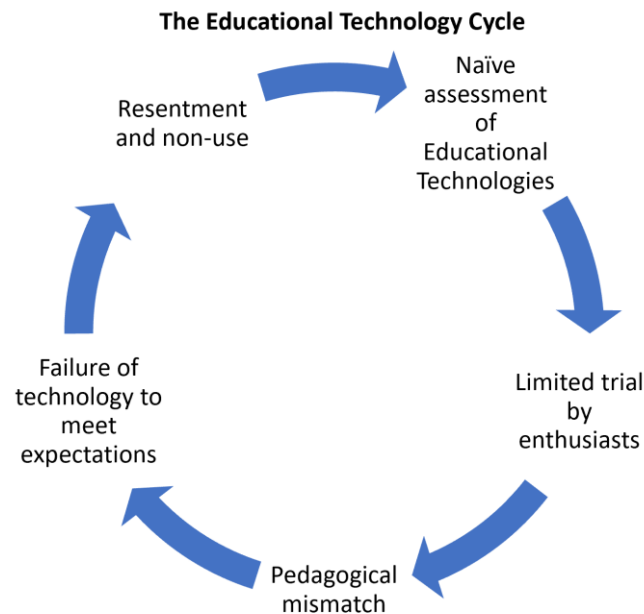
Figure 2.4-1 - The Educational Technology Cycle (adapted from Sanders & George, 2017)

Initial decisions are taken in a top-down manner, with naïve assertions as to the value and practicality of such technologies (Sanders & George, 2017). Enthusiastic educators, typically with strong social constructivist beliefs on technology typically are the first to volunteer to trial technologies with predictably favourable results (Tondeur et al., 2017). When the technologies are proliferated out to other educators, there is a pedagogical mismatch where educators fail to fully harness the opportunities provided by the technology, resulting in what is perceived as a failure of the technology. Ultimately, it ends in resentment towards the technology and a lack of use (Sanders & George, 2017).

Maddux (1986) suggested that technology is susceptible to what she calls the pendulum syndrome, where new and exciting technology was introduced with wildly optimistic promises of enhanced teaching and consequent learning, liberating learners and teachers alike, promising a richer learning environment. As the pendulum crescendos, frustration sets in as it becomes apparent it is increasingly difficult to incorporate the technology into practice and quantify the impact on learning, leading to a pedagogical mismatch and a perceived failure of the technology to meet elevated expectations. The pendulum then swings back in the opposite direction, gathering disdain and ultimately resentment. Selwyn (2017, p. 68) considers technology in education akin to "Groundhog Day" taken from the film where the

protagonist experiences the same event over and over again, with educators prone to similar experiences when introducing new technology into the learning environment. Educational film is cited as an early example of a technology that promised so much yet the evidence as to the impact on learning "were equivocal" (Smith, quoted in Selwyn, 2017, p. 52). In more recent times, the potential of television to have a positive impact on education, was met with enthusiasm that "...surpassed even the excitement and hyperbole directed towards film and radio before it" (Selwyn, 2017, p. 56). Yet as Seylwn notes that by the 1980s, it was generally accepted that television did not achieve what the initial enthusiasm predicted, with findings suggesting that there was insufficient teacher training on the use of television in the classroom, insufficient suitable viewing material to incorporate into the learning environment and ultimately, perceptions of low quality of what programming was available (Selwyn, 2017, p. 58). Such findings are notably similar to commentary from educators on contemporary educational technologies with Reid (2014) noting that such technologies to not exist in a vacuum and need to be viewed within the broader institutional context.

2.5   Integrating Technology into in the Educational Context

The operationalisation of integrating technology into pedagogical practices typically ends up with teachers (Reid, 2014). Taking technology from the novelty associated with newness into an effective tool that facilitates and enables learning is something that teachers have been grappling with since the early 1980s (Tamim et al., 2011). But teachers have often been unfairly criticised for not embracing technology and incorporating whatever form it takes into their teaching practices. The successful integration of technology into the learning environment requires multiple changes in multiple domains of teacher practice (Ertmer, 1999). A number of key determinant factors of technology integration include experience with technology and attitudes towards technology, with those that have more experience more likely to view technology in a positive light and are therefore more likely to successfully integrate technology into pedagogical practices (Tondeur et al., 2017) . But even when teaching staff do attempt to integrate personal technologies in the classroom, they are often faced with unexpected issues such as incompatible devices, learning management systems that are not fully supported on mobile devices, lack of power sockets to recharge mobile devices and a lack of technical knowledge (Song & Siu, 2017). When the role of the educator

in a technology-rich environment begins to drift into technical support, reluctance to integrate technologies is understandable (Selwyn, 2017, p.113).

However, there are many examples of successful integration of technologies into the learning environment (e.g. see Falloon, 2015; Elliott-Dorans, 2018; Stamm, Triller, Hohoff, & Blanck-Lubarsch, 2019). But such examples underscore the somewhat ad-hoc implementation and use of educational technologies outside of a formal, pedagogically-robust framework. Consequently, a number of technology adaption models have been developed to formalise the adoption and use of technologies. These models have been developed to represent technology integration, some of which are focused on broader technology integration into social situations such as places of employment (Venkatesh, 2003) and some which are explicitly related to the educational environment (Mishra & Koehler, 2006).

2.6   Technology Adoption Models

A number of frameworks for technology integration in education have emerged from the literature. Levels Of Technology Integration (LOTI), as the name suggests, is a model for determining the extent to which technology is implemented in the learning environment (Moersch, 1995). Ranging on a scale from zero (no implementation) to refinement (level 7 on the scale), the model is an early attempt to measure the extent to which technology is used in education. Efforts to integrate are classified on areas such as awareness of technologies (though little or no demonstrated use) to the integration (basic/mechanical and routine) and ultimately to the level of refinement where the "use of ICTs is seamless and invisible" (Moersch, 1995). Another such model is the SAMR model, where technology use is measured in terms of Substitution, Augmentation, Modification and Redefinition (Puentedura, 2013). Substitution is where technology replaces a current artefact. In his study on academics using iPads in their teaching practice, Aiyegbayo notes that using the iPad to record what was previously recorded on paper is an example of such an activity (Aiyegbayo, 2015). The next step is Augmentation where technology goes beyond basic substitution and offers enhanced functionality. In research describing the use of iPads in a first year undergraduate programme in physics, Van der Vental et al describe how a combination of the device, in addition to software, is on the Augmentation step of the model, enabling students to collaborate on work in real time (Van Der Ventel et al., 2016). The third step in the model is Modification where a learning activity is significantly changed and could not be achieved with more traditional

methods. Van der Vental et al again provide an example of a piece of software that facilitates a collaborative activity between students that involves creating new content, which they describe as fitting into the Modification category (Van Der Ventel et al., 2016). The final step in the model is Redefinition, where technology offers the engagement in new tasks, previously inconceivable without the use of technology. Fabian and McLean give one example of such a task in their research conducted in the Further Education sector, where students studying languages were able to create a comic strip using the camera on the device and associated software, not something that had been previously conceived within the course and therefore utilising technology in a novel manner to engage students (Fabian & MacLean, 2014).

What the previous two models lack is the contextual and domain-specific knowledge that educators possess. In addition, the models also fail to take into account educators' knowledge of pedagogy and how it intersects with domain knowledge. Add into this the complexities introduced by technology and it is clear a further refinement is required. This refinement is provided by the TPACK model – Technology, Pedagogy and Content Knowledge (Mishra & Koehler, 2006). The model acknowledges the overlapping considerations of content, pedagogy, and technology and focusses on the how of technology integration in education within this context. The model suggests that teachers simply learning skills on how to use technology is insufficient, it requires a deeper understanding of technology and how it can be applied to compliment domain knowledge and pedagogical knowledge. Given the centrality of educators to the education process, it is not surprising that TPACK's main focus is on the teachers. However, it is again apparent that the student perspective is absent from such models, raising questions as to whether it is simply a question of the centrality of the educator in the learning process. Or perhaps whether it is a case that the students have less opportunities to shape the educational environment. With the proliferation of personal technologies into the learning environment, perhaps a more up to date model is required.

If there are a number of ways to model the integration of technology in education, it would not be unreasonable to suggest that there are an abundance of examples of such integration. As I have discussed in section 2.3, technology integration in education is not as widespread as might be expected, with inconsistent implementation and limited empirical evidence to suggest successful impact on learning achievement. In addition, there is an unfair perception

that educators are broadly resistant to change and unwilling to take risks with new, unproven technology (Howard, 2013). While there is a significant body of work in the literature detailing successful implementation of technology in the learning environment (Crompton & Burke, 2018), there is also evidence to suggest the impact of technologies can be temporary (Higgins, 2010). There also appears to be a significant gap in the literature in respect to students who attempt, usually of their own volition, to harness the features of technology for the betterment of their education. Given the reasonable assumption that an undergraduate student would not be particularly versed in pedagogical practices, an investigation into motivations for utilising a tablet devices in the learning environment may benefit from a consumer framework perspective, rather than a pedagogical perspective.

Once such theoretical framework is the Unified Theory of Acceptance and Use of Technology 2 (Venkatesh, et al, 2012). This framework, originally developed for technology acceptance in an organisational context, was modified to incorporate factors of acceptance in the consumer domain, which necessitated a number of modifications of the original model. Present in the original model was *performance expectancy*, defined as the degree to which users expect the device to perform when undertaking particular activities. In the organisational context, this originally referred to how a new technology would facilitate a worker in performing her duties. In a consumer context, it refers to how a consumer perceives the device will assist in attaining goals. The next attribute present in the original model was *effort expectancy*. This originally was a measure of the trade-off between the effort to use a technology and the return on investment on this effort. In a consumer context, this may be attributed to the ease of use of a consumer technology, such as a tablet device. *Social Influence* relates to how a person perceives the manner in which others believe technology should be used. In the present context, it refers to the extent to which users of tablet devices are influenced by family and peers about their usage or perceived effectiveness of the tablet device. From an organisational context, *facilitating conditions* refers to the perceived level of support a user of a given technology feels they have available to them. This translates well to the consumer realm, when purchasing a tablet device, the level of support a consumer perceives is important to them. Also specific to the consumer domain, *hedonic motivation* relates to the amount of enjoyment derived from using a technology. Within the context of this study, the use of a tablet both on-campus and off-campus was investigated, as was non-academic use.

Therefore hedonic motivation is of particular significance within the context of this study. *Price Value* is possibly one of the most important attributes of the model. In an organisational context, users of technology are shielded from cost as this will be borne by the organisation. However, in the consumer realm, the cost of technology is one of the key attributes of concern when making a purchasing decision on a new piece of technology. The final attribute in the model is *habit*. This is defined as the extent to which users of technology tend to perform behaviours automatically.

2.7   Motivation

Given the accessibility and physical characteristics of personal technologies, some studies suggest that in Higher Education, between 60% and 80% of students use personal laptops during a lecture (Elliott-Dorans, 2018). What is not clear from the literature is what the motivation of those students to purchase such devices and use them in that context. While Venkatesh et al's concept of hedonic motivation is one such construct, the broader psychological constructs of intrinsic and extrinsic motivation also appear applicable to this context. Ryan & Deci (2000) suggest autonomy is a core construct of their self-determination theory, intimately linked to intrinsic motivation. They note that teachers who facilitate learners' autonomy ultimately amplify those learners' intrinsic motivation, cultivating a sense of curiosity and a desire for more learning. It may be conceivable that students who purchase tablet devices of their own volition may be seeking a form of autonomy by taking responsibility for their own learning, in the absence of such affordances from the educator. It raises the question as to whether by using tablet devices, participants are developing their own digital pedagogy therefore increasing their own sense of autonomy that appears to be absent in the learning environment. But there still remains the question of why educators appear reluctant to harness the power of technology into the learning environment. It would appear that bringing technology into an environment such as education that is based on established practice and has been developed over an extended period is a significant challenge. It is to this I now turn.

2.8   19th or 21st Century Skills?

As technology evolves and society moves with it, a growing acceptance of the knowledge economy is prevalent in the literature (Lai & Hong, 2015). This new economy, where employees work with ideas, people and systems rather than tangible objects demands that

the education system equips future workers with a new set of skills (Breslow, 2015). The demand for such skills is given further imperative by the threat of automation to low-skill jobs. Workers of the future need to ensure they are incapable of being rendered obsolete by technologies such as Artificial Intelligence for so-called knowledge workers, and robotics for more manual-based jobs (Arntz et al., 2016). The education system has a societal and moral obligation to ensure that such workers are suitably prepared and can contribute to society in a meaningful and productive manner. While fears of replacing humans with technology are real, the widespread replacement of this happening is still some time away (Arntz et al., 2016). It has been suggested that up to 50% of jobs undertaken by people could be automated, but given the rapid pace of technological advance, it is particularly difficult to suggest in what timeframe this could take place (Waters, 2017). Therefore it is incumbent upon educators to ensure that workers of the future have the necessary characteristics and attitudes to upskill and meet the challenge of these new roles, with technology playing an important part (van Laar et al., 2017).

This new, rapidly evolving global economy is propelled by digital technology, where information and knowledge are the cornerstones of wealth and wellbeing (Soulé & Warrick, 2015). In recognition of this new digital reality, a significant amount of effort is being devoted to defining key skills that will be needed by young people as they enter the workforce and play a productive role in such a society (Voogt, Erstad, Dede, & Mishra, 2013). Not only will they need to be able to change with the rapidly changing technology landscape, they will also need to be able to engage in lifelong learning and learn to unlearn. These so-called 21st century skills, it is suggested, are critical as we enter this new world order and traditional notions of employment, such as manufacturing and the production of goods, shifts to service provision and creativity. Among the many frameworks for such skills, there is general consensus on what these 21st century skills are - collaboration, communication, digital literacy, citizenship, problem solving, critical thinking, creativity and productivity (Voogt & Pareja Roblin, 2012). While such frameworks generally focus on secondary education, there is also general consensus on the importance of such skills with policy makers, educators and various international bodies agreeing that these skills should equip young people with the abilities and attributes for jobs that may not yet exist (Voogt & Pareja Roblin, 2012). But it would be a mistake to assume that these 21st century skills are entirely new and only relevant

to this century (Silva, 2009, Higgins, 2014). The notion that the Industrial Revolution could have occurred without problem solving, critical thinking, collaboration and creativity is quite a stretch. Society, therefore, has always demanded such skills. However, there is one aspect of 21st century skills that makes them novel, that of digital technology. This added dimension of technology demands a new form of literacy - digital literacy (Ting, 2015). Rather than replacing traditional literacies such as reading, mathematics and science, digital literacy is placed firmly on top of such literacies and uses them as a foundation (Higgins, 2014). These digital literacies go beyond the basic use of the computer and office software applications, demanding higher-order skills of information retrieval, evaluation and synthesis (Soulé & Warrick, 2015). Breslow (2015) articulates the difference between traditional literacies and digital literacies as skills of the hand and skills of the mind. Learners need to not only to have such skills, they also need to employ these skills while working in more abstract and creative domains. The ability to utilise technology, discern relevant information from irrelevant, and harness the power of technology for the betterment of themselves and society are critical to their future success (Mitchell, Gottfried, Barthel, & Sumida, 2018).

Three key domains of digital literacy have been suggested – information literacy, Information and Communications Technology (ICT) literacy and technological literacy (Voogt & Pareja Roblin, 2012). Information literacy is the ability to search, analyse and synthesise information. Given the ease with which information can be published on the internet, the ability of learners to effectively critique such information is vital. The ability to recognise the relevance of the information is just as important as recognising the reliability of the source of the information and any potential bias or conflict of interest. Voogt et. al describe ICT literacy in terms of the more traditional ICT competencies, such as using software, saving and retrieving files and backing up critical information. Managing data that forms information and eventually knowledge, is a key skill. Technological literacy, is the efficient use of ICT literacy in a knowledge society to achieve goals (US Department of Education, quoted in Voogt & Pareja Roblin, 2012). Knowing what tools and resources are available, and how they can be effectively used in the achievement of goals is a vital skill of the information age learner and knowledge worker.

2.9 The Myth of the Tech-savvy Student

The need for these 21st century skills is tempered with the parallel debate on 21st century learners, or, as Prensky (2001) refers to them as, Digital Natives. These learners, born after 1990 have been immersed in technology since birth and, Prensky suggests, have differing learning styles to previous generations (Prensky, 2001). Prensky goes so far as to assert that "[t]oday's students are no longer the people our educational system was designed to teach". These learners display a range of attributes that, at first glance, appear to suggest that they have already developed a number of these 21st century skills and can apply them to not only the traditional literacies, but also to the use of technology. These learners put a lot more emphasis on informal learning, engage in rapid multi-tasking, gaming, collaboration and communication, framed within the constructs of non-linear thinking and instant gratification (Prensky, 2001). A type of learning that Prensky argues, current teachers are not equipped to handle. But the concept of the Digital Native is defined by the use of technology for personal empowerment and communication and does not necessarily translate into profitable use in an academic environment (Kennedy & Fox, 2013). Furthermore, gamification is suggested as the manner in which to best engage these kinds of learners. However, this argument ignores the fact that games encourage the efficient and speedy attainment of goals, when again translated to an educational environment result in surface learning underpinned by minimal effort (Macfarlane & Tomlinson, 2017). The apparent affinity of Digital Natives' for multitasking and learning at "twitch speed" appears at odds with the empirical evidence that multitasking has an overly negative impact on academic achievement and wellbeing (Lau, 2017).

The concept of the digital native predates social media and contemporary web technologies and as such, the model no longer appears as relevant. While it has generated significant debate in the literature, with commentators suggesting that Digital Natives are not a homogenous group (Thompson, 2015) and are not that radically different from previous generations of learners (Bennett, Maton, & Kervin, 2008) and the very suggestion that they are particularly tech-savvy is a myth (Switzer & Switzer, 2013), the evidence would suggest the concept was at best a naïve observation on young technology users, without any due consideration given to how such use could be harnessed through enhance pedagogical practices (Flanigan & Kiewra, 2018). The moral panic educators were said to experience in

their own fear of their perceived lack of ability to teach this new type of learner has now mostly subsided (Bennett, Maton, & Kervin, 2008). Furthermore, commentators are even suggesting that in an effort to effectively utilise technology in the classroom, educators should categorically reject the Digital Natives myth and implement policies to selectively incorporate personal technologies into the learning environment (Flanigan & Kiewra, 2018).

A more contemporary concept of a new type of learner is that of the Visitor and Resident model (White & Le Cornu, 2011). Using this metaphor, learners are placed on a continuum based on the extent to which they use technology, particularly social media. The Visitors metaphor suggests that the use of technology and the internet is somewhat discrete, with a specific purpose in mind, such as an airline booking site or a database lookup. In contrast to this, the Resident is a person who sees the internet as a place to form social groups, unhindered by geographical location, on which a digital identity is formed by engaging with peers, posting opinions, images, videos and links. While no learner is going to fit neatly into either category, it provides a more contemporary and conceptually robust metaphor for learners in the age of pervasive technology and social media.

Whatever the stance on this generation of learners, it is clear that the tools and techniques available to them suggest an opportunity to learn in new and exciting ways, while developing these 21st century skills. The challenge for educators is how to nurture these 21st century skills with these 21st century learners. But the question remains whether these skills explicitly taught as separate subjects, or whether these skills are taught implicitly, embedded within other tasks such as activities, assignments or project work. In addition, there appears to be a conflation of 21st century skills with digital literacy, with the former being described as conceptual-level skills, and the latter operational-level skills (van Laar et al., 2017).

Some commentators have suggested that contemporary schooling is still stuck in the industrial era, the structure of which has not evolved much in line with society and technology (Soulé & Warrick, 2015; Dede, 2011; Higgins, 2014). Assessments are typically tailored to the synthesis and construction of knowledge (van Laar et al., 2017), with little or no emphasis on the processes utilised in these activities, a sentiment that appears to be in contrast to many of the 21st century skills the frameworks suggest are key. Kemp & Seagraves (1995) report on an effort to incorporate the assessment of knowledge-acquisition skills into coursework that not only varied widely in its implementation, but also appeared to cause significant confusion

among students. So what are educators to do? A radical rethink of pedagogy is required if educators are to meet the demands of the 21st century society (Voogt & Pareja Roblin, 2012; Voogt, Erstad, Dede, & Mishra, 2013; Soulé & Warrick, 2015;Dede, 2011). A shift away from knowledge-based assessment, to assessing the process of attaining knowledge may equip learners with the required skills. In an investigation into student information searching and retrieval skills, Qayyum & Smith (2018) found that students tended to skim and engage in non-sequential reading in an effort to find material they deemed of relevance to an assessment. Differences were found between novice and experienced students, suggesting that in addition to providing novice students with training on search and retrieval skills, educators also required training on assessment design to facilitate such students.

A combination of formative and summative assessments, that are multi-modal while maintaining the philosophies of being fair, reliable and achievable, are key (Asghar, 2012). The common factor in the instruction of such skills in the literature is technology (Voogt & Pareja Roblin, 2012). Yet, as I have argued in section 2.1, the successful application and utilisation of technology in education is still subject to intense debate. Dede suggests the concept of "boutique interventions" where technology is introduced into classrooms successfully, but for the most part such interventions are heavily context-dependent and not scalable (Dede, 2011). This, Dede argues, is primarily due to the current labour-intensive model of industrial-era education which he argues can be streamlined by heavily integrating technology into education. This requires a significant change in pedagogical practices, something that has been remarkably difficult to achieve.

2.10 The Grammar of Schooling

The question of why technology has not been integrated into teaching and learning to a great extent continues to feature in the literature (Sanders & George, 2017). At primary and secondary level education, Tyack & Tobin (1994) question why the structures, practices and philosophy, or the grammar of schooling, has been so impervious to change. They note that there is a prevailing sense of reluctance to alter something that has proven to work over the past hundred or so years. Radical change is not just an addition to current practices, it requires a substantial alteration in teaching philosophy and practices, resulting in significant extra effort from educators. In addition, habit, they note, is a labour-saving device (Tyack & Tobin,

1993). But to suggest that the reluctance to integrating technology into education to laziness is to do a great disservice to the many great teachers and administrators. The problem is multi-faceted and deeply ingrained within the complex socio-political environment of the education system. Selwyn (2017) suggests that the very structure of schools is not conducive to integrating technology and that the failure to integrate technology is more a failure to acknowledge the social nature of learning, than a failure of the technology itself. Naïve assertions of the value of technology in education lead to unreasonable expectations. Proponents of technologies such as smartboards, laptops, smartphones and tablets, make claims that appear to be strikingly similar to those made with previous technologies such as the phonograph, the television and the projector (Phillip & Garcia, 2013; Sanders & George, 2017). While on the face of it, schools utilise technologies such as whiteboards, wireless connectivity and tablets, the underlying nature of education remains relatively less technologically advanced (Selwyn, 2017, p.131)

Technology appears to offer a lot to educators – rich media, interactive experiences, autonomous and personalised learning, communication, collaboration and new realms of creativity (Onyema & Daniil, 2017). Personal technologies, such as tablets and smartphones appear to offer even greater opportunities for situated learning, shifting the learning not only away from the teacher, but also outside of the classroom (Baran, 2014). These opportunities compliment the parallel demands of educating 21st century learners with 21st century skills. The literature is relatively consistent on why there has been so little progress on the deep integration of technology into pedagogical practices. Teachers from kindergarten right up to higher education report similar issues and constraints – lack of time to incorporate technology into teaching practices, accessibility of technology, too generic professional development, teacher beliefs and perceptions of self-efficacy when using technology (Nikolopoulou & Gialamas, 2015; Pittman & Gaines, 2015; Reid, 2014). Voogt and Pajera Roblin, (2012) suggest another part of the issue lies in the very definition of the role of 21st century competencies and the location within the curriculum in which they are situated. While there is consensus on the skills, there is conflict on the implementation. Technology does not appear to be the panacea it is held up to be (Livingstone, 2012; Sanders & George, 2017; Selwyn, 2017). Perhaps the issue is that technology is not the panacea, but that the concept of such

convergence of approaches to implement technology in an educational setting does not work because there are so many more factors that are not given due consideration.

2.11 Teachers and Technology

I have already explored the tendency of academic administrators at all levels to make demands of educators in relation to the use of educational technology (Selwyn, 2017). In addition, pressure from stakeholders demand school leavers and graduates are technically competent and can effectively utilise technology (J. Voogt, Erstad, et al., 2013). This leads to ever increasing demands on educators to incorporate technology into teaching practices. Again, the definition of technology in education comes into question, with the literature suggesting that there are core technologies such as presentation software (e.g. Microsoft Powerpoint) and Learning Management Systems (e.g. such as Moodle and Blackboard), with all other technologies being considered as non-core (Shelton, 2014). When viewed from this perspective, the integration of technologies takes on a different meaning, with a clear distinction required between "use" and "integration".

The integration of technologies appears to be one aspect of the grammar of schooling that is notably difficult to achieve, despite the prevalence and relatively lower cost of technologies, and the positive light in which technology is perceived. Schools appear to have trouble in systematically incorporating technology into the learning environment (Orlando, 2014b). From a teacher's perspective, Reid (2014) suggests that a significant barrier to the successful integration of technology into pedagogical practices is the lack of teacher skills and knowledge, with Shelton (2014) suggesting confidence with technology is also a significant factor. The issue of professional vulnerabilities is amplified by negative experiences with technologies and the risk of losing face in front of a room full of students (Cramp, 2015). The perceived loss of status, is also cited as a concern, where once teachers were seen as having significant pedagogical knowledge, but lack significant technological knowledge, of particular relevance to older teachers (Orlando, 2014b). In addition, Reid comments that with the move to casualisation of faculty in higher education, part-time lecturers typically have little or no pedagogical background and are less likely to avail of CPD opportunities. But it is also acknowledged that the successful integration of technology into education is not just predicated on technology-related factors (Tondeur et al., 2017). The literature suggests there are a number of factors that influence the willingness of teachers to incorporate technology

into practice. One such factor is the teaching philosophy of the teacher, with those of a social constructivist viewpoint more likely to adopt technology (Tondeur et al., 2017). Such teachers appear to be able to utilise the features of various technologies to enable a student-centred, collaborative and engaging learning experience, while allowing for both planned and unplanned activities. Tondeur et al's findings suggest other factors most likely to influence a teacher's use of technology in the classroom include prior experience and positive experiences with technologies, noting that generic professional development appears to be particularly ineffective. Tailored professional development is a key factor in the success of integration of technology, suggesting the need to have positive experiences of technology in an educational context. Irrelevant and inconsistent CPD appears quite frequently as a source of frustration in the literature, reducing such positive experiences, or at worst, failing to create much needed positive experiences of technology (Orlando, 2014a; Voogt, Knezek, Cox, Knezek, & Ten Brummelhuis, 2013; Kim, Kim, Lee, Spector, & DeMeester, 2013). Examples are cited of CPD that is lacking in many respects with suggestions that it can be too generic, too rushed and demonstrating technology they will never use (Pittman & Gaines, 2015). In some cases, researchers find that implementation of technologies for use in teaching practices without any supporting and relevant CPD as a significant barrier to the incorporation of technology that ultimately leads to them not using such technologies (Shelton, 2017). The literature also suggests that the focus of what CPD is available is on the mechanics and operation of the technologies, rather than the effective use of such technologies in the classroom (Ertmer, 1999; Reid, 2014). The application of educational technologies and the context within which they can be applied appears to be lacking from CPD programmes.

While it may appear that broad, generic and infrequent CPD can be ineffective, there is evidence to suggest that targeted, relevant and timely CPD can be effective. In particular, the alignment of teacher interests and pedagogical beliefs and strategic objectives of technology implementation can be successful (Hammond, 2014). Mueller et al suggest in addition, an alignment with teacher attitudes and behaviour is also a key component of successful CPD (Mueller et al., 2008). However, the issue of CPD for educators should be tempered with the acknowledgement that with the rapid change of technology, teachers can never be fully up to date (Tallvid, 2016). Therefore, CPD should be targeted to develop broader ICT skills and understanding of technology, and empowering teachers to adapt to the introduction of new

technologies, in addition to supplemental CPD on specific technologies (Tallvid, 2016). Teachers should be able to utilise technology in new and previously untried ways to create what Ertmer calls a "new vision for teaching and learning" (Ertmer, 1999).

Another often forgotten perspective is that of the educator as an employee. Selwyn suggests that it is important to remember that educational establishment is also a place of work (2017, p. 106). The use of technology during the undertaking of tasks as an *employee* needs to be contrasted with the use of technologies as an *educator*. Selwyn suggests that the two are not necessarily mutually exclusive, but subject to what he notes as a strategic use and that if an educator as an employee cannot see the benefit of technologies when discharging her duties as an employee, she is less likely to utilise them in her context as an educator.

2.12 Behaviourist vs. Constructivist

There is a significant body of evidence to suggest that teacher's beliefs about learning and teaching and the nature of pedagogy have an influence on their likelihood to use technology (Kim et al., 2013; Orlando, 2014b; Mueller et al., 2008). The literature suggests those of a Behaviourist belief are less likely than those of a constructivist persuasion to integrate technologies. The distinction between Behaviourist and constructivist goes back to the early formation of learning theories, with the Behaviourist tradition more concerned with teaching rather than learning (Selwyn, 2017).

Early theories of teaching emanated from the Behaviourist tradition where learners were viewed as passive recipients of knowledge from an experienced educator (Selwyn, 2017, p. 74). The unidirectional transmission of information was viewed from the perspective of changing behaviour, with the teacher responsible for the stimulus that will ultimately lead to a change in behaviour, induced by feedback and reinforcement. Skinner's Teaching Machine is an early example of an educational technology that is based on the premise of breaking a learning objective into a discrete number of steps, with each step being tackled in sequence (Skinner, cited in Selwyn, 2017). Feedback is a core component of the learning process, which is provided upon the successful completion of the discrete steps. This mechanism was easily applied when digital computers became widely available, with computer aided instruction becoming increasingly common not only in the early days, but right up to now (Kulik & Fletcher, 2016). With the focus on discrete steps, such software lent itself well to learning that required knowledge of discrete components, in particular vocabulary and core

mathematics skills (Williams & Hoover, 1991). More recently, smartphones have become increasingly common in the teaching of language, in particular for second language learners (Pimmer et al., 2016). A modern take on drill-and-practice is provided by one piece of research that send words via Short Message Service (SMS) to learners and proved particularly successful (Walker, 2013). But while tools and techniques influenced by the Behaviourist tradition prove somewhat useful, some research suggests that educators who would describe themselves as aligned to the Behaviourist tradition, appear to be less likely than those who consider themselves as aligned to the constructivist tradition to use technology (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012).

Rather than adopt a fatalist attitude to technology, a more guarded approach is appropriate. There are many reasons to utilise technology in education, however it is vital this technology is integrated into pedagogical practices, rather than wedged in with naïve beliefs on technology's capabilities (Selwyn, 2017). An as yet unanswered question is whether the technology should act as a conduit for learning in the Behaviourist tradition, or more of a supplementary tool used during the learning process, without which, learning could probably still take place. Or, whether technology is nothing more than an organisational tool, used to manage the process of learning, through software such as learning management systems, calendar organiser and email, as suggested by Henderson et al (2017). As is common in educational technology, the answer is heavily dependent on the context.

As I have discussed in section 1.3, initial learning with technologies were firmly placed in the Behaviourist tradition of drill-and-practice, where the emphasis was on presenting material and information retention, such as the learning of vocabulary and spelling (Selwyn, 2017, p76). In this capacity, technology acted as a conduit, delivering and assessing material, with instantaneous feedback, with the emphasis on instructionist practice, which is in turn rooted in the Behaviourist tradition. As the functionality of digital devices increased, the potential shift to a constructivist form of learning was mooted, with the connectivity of devices providing ample opportunities for hitherto fore unrealised ways of creative thinking and collaboration between learners (van Laar et al., 2017). Yet the evidence of such a shift is limited. In a systematic review of mobile learning in higher education, it was noted that the vast majority of the 36 studies examined consisted of utilisation of such devices that was firmly rooted in the Behaviourist tradition (Pimmer et al., 2016). In a similar study of mobile

devices in higher education, Crompton and Burke (2018) noted that the most common subject matter studied in their systematic review was second language instruction, suggesting a Behaviourist slant to these studies.

As a conduit for learning, educational software applications appear to have gone full circle. Initial enthusiasm of the availability of drill-and-practice software waned as the focus shifted to more generic ICT literacy skills using office software (Cox, 2012; Hammond, 2014). However more recent developments, especially with the introduction of tablet devices such as the Apple iPad, have resulted in a substantial increase in software applications specifically targeted at domains such as spelling, grammar and mathematics, rooted firmly in the Behaviourist tradition (Falloon, 2013). Yet the usability features and physical characteristics of tablet devices present a novel and effective learning opportunity, embracing many of the 21st century skills such as collaboration and creativity (Falloon, 2015).

2.13 Student Conceptions of Learning at Higher Education

The majority of research to date on technology in education has focussed almost exclusively on the institution and the instructor, with various attempts to measure the impact of technology on student learning. When the student perspective is solicited, this is usually confined to survey responses or end of semester evaluations with the impact of technology reduced to somewhat subjective measures in a limited context (Hämäläinen et al. 2017).

However, as I have explored in section 2.1, quantifying such impact is complicated by not only the technology itself, but also by the inability to unequivocally attribute improvements in learning to such technology (Livingstone, 2012). But blaming educators for the lack of comprehensive integration of technology into the learning environment is an over-simplification of the complex social construct that is the classroom or lecture theatre. As I have also noted in section 2.1, attempts have been made to utilise technologies in the classroom and successes have been recorded. However, a comprehensive redefinition of education using technology has not happened and does not look like it will. Yet to dismiss technologies as an unnecessary imposition on the work of educators is to miss the potential offered by such technologies. Therefore, it is incumbent upon educators, managers and administrators, particularly at higher education, to facilitate learners who value technology and want this technology to be a part of their own learning experience. I now turn to the issue

of learners who bring personal technologies into the learning environment of their own volition.

Students at higher education bringing their own devices to lecture theatres is nothing new (Gaudreau et al., 2014; le Roux & Parry, 2017), but given the relatively recent appearance of tablet devices on the market, in addition to the appearance of such devices in lecture theatres, it provides a unique opportunity to investigate how students utilise them as part of the learning process, both on-campus and off-campus. It raises the question as to whether tablet devices are enabling students to be creators of their own digital pedagogies. Given the extent to which personal devices are ingrained in their personal life, it does not seem unreasonable that students could see potential of such devices in an educational context. However, before exploring the use of such devices, it pertinent to explore more established student conceptions of learning at higher education in an effort to suggest contexts within which learning with tablets might be situated.

Entwistle and Pearson (2004) suggest that students have three key approaches to learning and studying at higher education. The first, deep, suggest students have a desire to understand the material and are heavily invested in engaging in the learning process, even suggesting that such students are actively enjoying the learning process. However, such deep approaches to learning appear to be related to positive experiences of the teaching and learning environment, suggesting that instructors have a part to play in nurturing such an approach in students (Asikainen & Gijbels, 2017). Perhaps this might go some way to explain the prevalence of institute- and teacher-led initiatives with incorporating technology in education.

The second approach, surface, suggests students want to achieve nothing more than "coping" with the course they are studying, with focus narrowly trained on the syllabus (Marton & Saljo, 1976). This approach, suggest Asikainen & Gijbels (2017), is related to negative experiences of the teaching and learning environment, again suggesting instructors have a role to play in influencing student perceptions of learning and engagement. The third approach suggested by Entwistle and Pearson (2004) is strategic, with students investing time and effort into managing and organising their learning, guided by "an awareness of the assessment criteria." A technological solution to this management and organisation was suggested by Henderson et al who found evidence of higher education student engagement

with technology to be primarily related to organisation, management and ensuring currency (Henderson et al., 2015). While the study was purposely device agnostic, it offers an insight into students engaging in elements of organising, regulation and self-monitoring, all of which are strands in the concept of Self-Regulated Learning (SRL) (Zimmerman, 2002). In addition, students who engage in SRL tend to be driven and academically successful, therefore opening the question as to whether there is a link between student academic success and the use of personal technologies.

2.14 Bring Your Own Device

Research and activities involving personal devices in education typically incorporate students being loaned devices for the duration of the study (see Nguyen, Barton, & Nguyen, 2015; Van Der Ventel et al., 2016; Wardley & Mang, 2016). In one such study in an economics class, Castillo-Manzano et al report on a programme that loaned laptop devices to students if they did not have their own personal device. The results suggest a particularly contrasting difference between students who take a laptop to class compared to students who take a tablet to class. Laptop users (whether the laptops were loaned by the institution or owned by the students) typically had prior experience using such devices in an educational context and were more concerned with charging the devices. Tablet users tended to be more active on social media and less concerned with charging the devices, perhaps a reflection of the longer battery life of such devices (Castillo-Manzano, Castro-Nuño, López-Valpuesta, Sanz-Díaz, & Yñiguez, 2017). However the study notes that while only a minority of students (less than 18% in each case) bring devices to class, both groups are characterised by the demand that academic staff incorporate the devices into teaching practice. Or, as the researchers put it, students demand a better return for their investment in the technology. Given the relatively low numbers of students who bring devices to class, it opens up the question as to what such students do with these devices outside of class. This suggests that there appears to be a gap in the literature with respect to students who bring devices into class and subsequently what how such devices are used outside of the classroom.

Facilitating and encouraging academic staff to utilise the features of mobile technology and student personal devices still appears to be sporadic, with various reasons offered for the non-adoption (Gillies, 2016). In one research project, academics were given iPads for the purposes of teaching and integrating the use into their everyday academic practice. The study

was judged as having limited success (Aiyegbayo, 2015). Academics cited reasons such as a lack of professional development and not wanting to disadvantage students who could not afford iPads as reasons for not using the devices. The reduced functionality of iPads was also cited as a reason, with academics noting that they were better able to develop materials with desktop or laptop computers. While this study could be characterised by academics unwilling to embrace technology, the author notes that training and ongoing support are essential for initiatives such as this to succeed (Aiyegbayo, 2015). Such interventions usually providing a fleeting glimpse with the potential of such technologies, with researchers acknowledging that broader, longitudinal studies are needed to properly evaluate the potential of these devices (Nguyen et al., 2015).

The relatively new phenomenon in educational technologies of BYOD is an acknowledgement that personal devices have become sufficiently cost-effective, affordable and portable while offering significant functionality to enable their effective use in a learning environment (Johnson, Adams Becker, Estrada and Freeman, 2015; Sundgren, 2017). In addition, personal devices also open up the potential of a blurring of the time and location of learning, affording learners the opportunity to engage when suitable, a blurring of time and location (Sundgren, 2017). In some cases, educational institutions dictate the type and specification of devices learners are required to bring to effectively participate in class (Selwyn et al., 2017). The conformity offered negates the need for educators to take into account diverse functionality and software requirements of different devices when designing educational activities and materials, plus the support function is simplified for technical staff. However, Selwyn et al note in their study that the requirement of students to bring their own laptop devices in a number of secondary schools resulted in the laptops blending into the learning environment and, rather than radically altering and transforming practice, appeared to be subsumed into existing practice. They note that the original intention of BYOD had been reduced to "regulate and restrict". This resulted in what was once seen as an invitation for students to bring their own devices, morphing into an instruction to bring their own devices, with the result that personal laptops were no longer seen as belonging to the student and more as an instrument of the schools in question (Selwyn et al., 2017).

The use of personal devices in a learning context has evolved from basic interaction with a learning management system and consumption of learning material to broader

communication and collaboration (Sundgren, 2017). Learners can utilise software platforms such as Google Docs (Google, n.d.) and Facebook (Facebook, n.d.) to collaborate on assignments and work in virtual teams, building up communities and expanding the learning environment beyond the confines of the campus (Henderson et al., 2015). The literature suggests that personal devices offer a sense of social connectedness and opportunities for self-regulated learning that are not as accessible in more traditional technologies such as desktop computers (Sundgren, 2017). But this connectedness comes at a prices as both educators and learners alike see a blurring of the personal space and public life when using personal devices, with traditional boundaries becoming increasingly less clear (Evans, 2014). Even within the classroom, immediate connectivity to the outside world invites what Aagard refers to as bringing the "outside-in" offering students the ability to bring relevant and appropriate material into the learning environment in real time, but also offering immense opportunities for off-task activities and distractions (Aagaard, 2016).

Like much of the current wave of educational technologies, research into learners bringing their own devices as still at a very exploratory stage. While institutions are willing to facilitate learners bringing their own devices, there appears to be limited evidence to suggest that mandated BYOD is widespread (Gillies, 2016).

2.15 Personal Devices

The advent of personal mobile devices such as laptops, tablets and smartphones, in conjunction with ubiquitous connectivity, suggests that learners can engage at a time and location of their choice (Pimmer et al., 2016). Widespread connectivity offers communication and collaboration opportunities that were unheard of only a short time ago. I now explore what the educational landscape looks like when populated with such devices.

2.16 The Laptop

Recognising the potential of mobile personal devices in learning, the literature is awash with examples efforts of educators to harness the power of such devices to enhance the learning experience for students (e.g see Castillo-Manzano et al, 2016; Bell, R., Glen, A., 2008; Keppler et al, 2014). In particular, laptops were early examples of significant computing power, with an abundance of software in addition to networking and storage capabilities, all in a portable device that could be easily transported from classroom to lecture theatre to the laboratory. But like other technologies, the relative cost of purchasing laptops, which typically command

a premium over comparably-powered desktop computers, in addition to the complexities of integrating such technology into the learning environment, have resulted in laptop computers primarily being purchased for use by students rather than institutions (Ragan et al., 2014).

Probably one of the more common uses of laptops in a third-level setting is in the taking of notes during the traditional lecture (Gehlen-Baum & Weinberger, 2014,Ragan, Jennings, Massey, & Doolittle, 2014). Note taking has been shown to beneficial to the learning process, with the subconscious processes of encoding information during a lecture contributing to learning and retention (Mueller & Oppenheimer, 2014). Students self-report that they find it more efficient than using pen and paper, but also acknowledge to being prone to distractions due to the multi-tasking capabilities of the devices (Aagaard, 2015a). Note taking can be divided into two distinct categories, verbatim transcription of the utterances of a lecturer, or the more generalised summary, noting key points, with the research suggesting that the former results in shallower, surface-level learning (Mueller & Oppenheimer, 2014). But opinions are still divided as to whether there is a difference between traditional note taking with pen and paper compared to note taking on devices such as laptops. To investigate this difference, Mueller & Oppenheimer (2014) undertook a number of studies and found that students using laptops to take notes tended to user verbatim transcription, resulting in lower levels of comprehension and conceptual understanding compared to participants who took notes using pen and paper. It therefore raises the question as to whether note-taking is another skill that needs to be explicitly taught at the early stages of undergraduate education in an effort to achieve greater effectiveness and therefore have a positive impact on the learning process.

2.17 Distractions

But it is not only the quality of notes that are of concern with laptops in the lecture theatre, the very fact of using them also appears to be a cause for concern. The notion of distractions when using laptops features heavily in the literature, with one study suggesting that the majority of time spent on mobile devices in a lecture theatre is actually spent on off-task activities (Gehlen-Baum & Weinberger, 2014). Student attention wanes after a relatively short period of time, with the multi-tasking features and wireless connectivity providing ample opportunity for students to engage in off-topic activities. But can they help it? Aagaard (2015) suggests that such distractions are actually as a result of prereflective involuntary activities,

that to engage in off-topic activities using personal digital devices such as a laptop during a timetabled educational activity is actually an involuntary action. This may be as a result of, he suggests, difficulty with the material being presented where the students disengage because they do not understand the topic. Whatever the cause of such distractions, there appears to be a link between off-topic use of laptop devices and academic achievement (Gaudreau et al., 2014). Gaudreau et al's findings suggest that laptop use is a significant indicator of academic achievement, with off-topic use of laptops related to a lower end of semester grade point average. So what is an educator to do? It would appear that the various attributes of laptops would lend themselves well to the learning environment, something educators have been attuned to for a long time. However, the screen or lid of a laptop presents a physical barrier to interaction, with students seemingly closed off in their own world, apparently disconnected from the activities around them (Van Daele, Frijns, & Lievens, 2016). Telling students to "close the lid" and put laptops away for a portion of the lecture is not necessarily a solution as Aagard (2015) notes. In his study he observed students who had closed off their laptops resorting to using their smartphone under the table when they believed the lecturer was not looking. To suggest that an outright ban on technology devices in an educational environment is a solution would be a fallacy, in particular as the capabilities of personal technologies evolve and become more useful in the broader learning context.

2.18 Contribution to Learning

The use of technologies in an educational setting is generally determined not by how much they are used, but rather how they are used (Tondeur et al., 2017). Laptops, in contrast to other technologies such as classroom "clickers" (Van Daele et al., 2016), can be used in a variety of different ways that contribute to the learning environment. Tan and Morris suggest a model of laptop use that falls into three dimensions, formal activities, non-formal activities and informal activities. Formal activities are as would be expected in a learning environment – activities that further the learning goals such as coursework, collaboration and communication. Nonformal activities are described as activities that are not prescribed by Faculty, that further personal or professional interests. Informal activities do not generally have any connection with educational attainment and tend to be more personal in nature. In their study, Tan and Morris (2005) use laptop usage as a proxy for lifelong learning potential of undergraduate studies, suggesting that the laptop has a broader role in learning than

achieving the learning outcomes of a course. In a study of digital technologies in university settings, Henderson et al found similar results, in particular with the mobile nature of laptops that facilitated students engaging in both formal and non-formal activities in a location and time of their choice (Henderson et al., 2015). The most significant use of such technologies was not specifically coursework, but what they refer to as "organising and managing the logistics of studying" which included activities such as managing schedules and deadlines in addition to keeping up to date with institute news and events. Personal technologies appear to have converged a point where the balance between utility, functionality, connectivity and portability has been reached. A point that is increasingly apparent to educators and learners alike.

2.19 Handheld Devices in the Lecture Theatre

If laptops offer an obvious source of potential distractions for the less engaged student, personal mobile devices such as smartphones offer a more discreet opportunity for off-task use. But to focus on the negative aspects of these technologies is to risk missing the potential that they offer in terms of interactivity and collaboration. With the physical attributes of smartphones, plus the widespread adoption by consumers, keen educators spotted an opportunity to harness the power and ubiquity of such devices to engage students in the lecture theatre. But changing the lecture theatre from an asynchronous, one-way conveyance of undisputed facts to a passive audience is not an easy task. Handheld "clickers" were an initial attempt to engage students, offering a number of options including multichoice questions, but only allowing participants to answer questions, not to pose any (Mayer et al., 2009). Results were promising, with Mayer et al's study suggesting that the engagement they observed by students using the clickers corresponded to an improvement in learning. As technology moved on, researchers began to see such participant response systems as antiquated and limited (Van Daele et al., 2016). Smartphones, by contrast, not only offered vastly superior functionality, but ubiquitous wireless access and are carried by 79% of the adult population in the UK (Ofcom, 2019). In one study, students taking a lecture were asked to bring a wireless devices, such as, but not limited to, a smartphone to engage with the lecturers during a number of sessions (Van Daele et al., 2016). The results again suggest students were more engaged and viewed lectures that used such technology more positively and looked for more such opportunities during future lectures. Such views of students suggest

that rather than insisting that students in lecture theatres put away their technology, actively encouraging them to use it and making it a part of the lecture might actually increase engagement and enhance the learning environment (Flanigan & Kiewra, 2018).

2.20 Here and Now Learning

The opportunities offered by mobile handheld technologies are not just limited to the lecture theatre. There is a significant body of research that suggests authentic, context-sensitive learning is more effective than classroom based learning and enables situated cognition (Brown, Collins, & Duguid, 1989). Learning from textbooks robs students of the context and culture of a topic, argue Brown et al, therefore immersing learners in authentic learning environments is conducive to positive learning outcomes and a deeper understanding of concepts. Mobile technology could offer further opportunities for learning, connecting to context-sensitive information and offering note taking features far and above what can be achieved with the more traditional notepad and pen. However, at higher education there does not appear to be a coherent, consistent body of knowledge on the applicability of mobile devices to such learning environment (Gillies, 2016; Nguyen et al., 2015). Beyond selective interventions, mobile devices are as yet an unproven phenomenon (Pimmer et al., 2016). The literature also suggests that students using mobile handheld devices are just as prone to distractions as those using other digital devices.

Martin and Ertzberger (2013) suggest the concept of here and now learning with respect to mobile devices in higher education. In an effort to segment the learning opportunities, they present a framework consisting of three strands for learning. These are learning that is engaging, learning that is authentic and learning that is informal. Consolidating these into one concept, they suggest the term ubiquitous learning, or ulearning, that consists of anyhow, anytime and anywhere learning (Martin & Ertzberger, 2013). No longer are learners confined to the classroom or laboratory, or even the institute campus, they suggest, using mobile devices students are free to learn at a time and location of their choice. In an effort to validate their framework, Martin and Ertzberger investigated the results of students being presented with information via a regular desktop computer prior to a field trip, compared to students who used a handheld device to view the same information during the field trip. The results suggest that there was a significant positive difference between the groups, but, not as would be expected. The group that obtained the information via the desktop computer scored

better than the users with the mobile devices. The authors suggest that while participants were enthusiastic about the mobile devices, it was to the point of distraction and reduced ability to focus on the learning experience. But again, rather than dismiss mobile technologies out of hand, some research that suggests mobile devices can play a positive role in specific learning contexts and in particular, those distractions could actually be harnessed to engage learners (Flanigan & Kiewra, 2018).

One study that supports this view was undertaken at a number of higher education institutions in the US, with participants utilising mobile handheld devices for a range of activities in relation to their learning (Gikas & Grant, 2013). Accessing information, communication, collaboration and the option to engage with learning at a time and location of their choosing were some of the positive aspects of the study. Participants were acutely aware of interruptions such as social media alerts, but felt they were able to balance such distractions from academic work. While participants did report some frustrations with the devices, overall the study suggests that they benefitted from the increased engagement that mobile devices offered. Of particular note was the ability to learn, regardless of location with participants commenting how they were able to use the devices to gather data outside of the learning environment. With the advances in technology, in particular ubiquitous access to wireless networks, situated learning appears to be facilitated by mobile devices. But there is a sense of using devices such as smartphones for the sake of it. The literature has many examples of educators that incorporate technology into the learning environment because they themselves have an interest in the technology (for example, see Kim et al., 2013; Tondeur et al., 2017; Ertmer et al., 2012). However, such research appears to suggest that smartphones are limited in their use due to their screen size. Conversely laptops, while portable and provide a larger screen size, could not be described as handheld. What was needed was a device that falls in between, offering handheld portability, with a large screen and extensive battery life.

2.21 The Tablet

In 2010, Apple released the first iPad (Apple, n.d.). Fitting a niche between the laptop and the smartphone, the device offered all the features of a smartphone, with a much larger screen and longer battery life. The device spawned a number of competing products with Google playing catch up and encouraging manufacturers to make competing devices, running

comparable but incompatible Google Android software (Google, n.d.). The year 2014 was the year tablets went mainstream, with a sufficient range of devices reaching the market, at affordable price points, and software functionality finally reaching a level of usability suitable for the age of the internet (Gartner, 2014). Educators were quick to realise the potential of tablet devices, with their relatively simple user interface, wide range of software availability and wireless connectivity. But are tablets susceptible to Maddux's pendulum syndrome? Caution is urged that such devices may become yet another hyped-up educational technology, with unrealistic expectations of transforming learning (Falloon, 2014; Los Angeles Times, 2015; Geer, White, Zeegers, Au, & Barnes, 2017). Falloon goes even further to suggest that schools in particular are almost seduced by the functionality of iPads, adopting them without due consideration being given to theoretical foundations and concrete evidence as to their effectiveness. Yet Geer et al note that while best practice for iPad use still remains elusive, there appears to be promising signs for the use of such devices in education.

2.22 Tablets in Education – Primary and Secondary

The literature suggests that iPads are the most prevalent in educational research studies, perhaps a factor of Apple's long history with education and the fact that the company was first to market with a tablet devices (Nguyen et al., 2015). Investigation into the effectiveness of software applications (apps) on iPads provides a particular challenge. One such study investigated how apps influenced learning pathways in young schoolchildren and found, with the irony noted by the author, that the most effective apps were those that mimicked the structure and format of learning sessions delivered by teachers (Falloon, 2014). However, fears of iPads replacing teachers are easily dismissed, with research suggesting that teachers are in fact the most important factor in the successful incorporation of technology in the classroom (Geer et al., 2017). Despite the evidence suggesting the importance of teachers, a common theme emerging from the history of educational technology is the need for effective, targeted professional development (Tallvid, 2016). In order to effectively utilise tablets, teachers need to be not only comfortable with the technology, but also able to see how tablets can be incorporated and afforded a level of autonomy to do so.

A number of studies suggest that despite tablets being primary for use on a 1:1 basis, the collaborative opportunities offered by the devices are increasingly seen as a unique feature and a promising opportunity for more involved learning experiences (Falloon, 2015; Geer et

al., 2017; Haßler, Major, & Hennessy, 2016). Hassler et al even suggest that higher student to device ratios might provide improved learning gains, coupled with associated value for money.

2.23 Tablets in Higher Education

Incorporating any technology at higher education is arguably a much bigger task than at secondary. With a much broader and more diverse student body, larger student numbers and dispersed and remote campuses, the challenges at first glance might seem insurmountable. But the literature contains no shortage of studies by researchers investigating the use of tablet devices at higher education, in particular at undergraduate level. Finding apps suitable for use at higher education proves to be somewhat problematic (Van Der Ventel et al., 2016; Davies, 2014) and educators rarely have the resources to develop bespoke software solutions tailored to their modules. Accordingly, research tends to converge around the use of tablet devices that utilise the collaborative functionalities of the devices. Van Der Ventel et al (2016) found the use of iPad significantly increased discussions and collaboration in a large (n=720) student group learning physics, with the multimedia and functionality of the device appearing to take second place to such discussions. Davies (2014) not only found the iPad facilitated discussion and collaboration, but also helped students become more engaged with the learning activities once initial hesitation with the technology was overcome. In both studies, one of the most salient points was the inability to provide every student with their own iPad, with researchers having to devise a number of workarounds to ensure parity and so as not to disadvantage students that did not have a device.

Providing large numbers of students with tablet devices is certainly beyond the means of most institutions, so in a number of cases, institutions have resorted to providing lecturers with devices. However, mandating technology to lecturers ignores not only the diversity of disciplines, but also the suitability of technology for individual subject domains (Shelton, 2017). But even when lecturers voluntarily engage with using tablets, views on the effectiveness or usefulness of the devices is not as positive as might be expected (Souleles, Savva, Watters, & Annesley, 2017). While investigating why lecturers do not view iPads as favourably, Aiyegbayo (2015) found that reluctance centred around the perceived limited functionality of the devices, with respondents noting how laptops were more effective for the work they undertook (e.g. preparing class notes and assessments). Two other key findings

include the fact that lecturers lack of familiarity with iPads and that they did not want to disadvantage students who did not have such devices. As Aiyegbayo notes, the when the iPad was designed, it was not intended to replace laptops, which opens up the possibility that institution administrators are again falling into the trap of buying devices such as iPads based on hype and novelty, rather than on the basis of sound empirical evidence as to their effectiveness.

2.24 The Future of Tablets

The literature suggests that there is yet to emerge a solid body of evidence for the effectiveness of tablet use in education (Nguyen et al., 2015). Educators and learners alike certainly appear to be enthusiastic about the value added by tablets and the potential they offer for new and enhanced learning experiences. But lacking from these sentiments is solid evidence and best practice and more importantly, generalisability of findings. In particular, there is ample evidence to suggest the device is welcomed enthusiastically by learners, but evidence as to the impact on learning outcomes is sparse (Nguyen et al., 2015). The findings from some research notes that tablet devices are most effective when utilised in a Behaviourist manner - presenting videos of teachers explaining concepts, suggesting the potential for new and exciting ways of learning with tablets have not yet been realised. The demand for collaborative engagement with devices that are designed for individual use further muddies the waters. Suggestions that technologies are being used more for educational management and the organisation of learning (Henderson et al., 2015), as opposed to engaging with learning activities adds further evidence to the suggestion that the power, functionality and potential of tablets is not being harnessed, in particular at higher education. However, it is important to appreciate that given the relatively short length of time such devices have been available to educators, developing a robust set of digital pedagogies to effectively incorporate them into the learning environment takes time. The emerging evidence suggests we are only at the beginning of a long journey.

2.25 Summary

The evolution of technology in education appears to have followed an arc rooted in the Behaviourist tradition, curving towards a constructivist ethos. The contrast between the early days of the drill-and-practice software, to the new Web 2.0 technologies could not be more pronounced. But while the technologies may differ greatly, the goals and aims of education

remain the same. The definition of technology in education, elusive for such a long time, still defies consistent definition, but that is perhaps more a reflection of the wide diversity of such technologies and the uses to which they can be put, rather than an inability of researchers and practitioners to come to a consensus. What is clear from the literature is that practitioners, researchers, administrators, parents, employers and all the other stakeholders can see the value in educational technologies. However, these views need to be tempered with realistic expectations of what should be achieved and what can be achieved in a learning context. A common mistake prevalent in the literature is to see technology as a panacea to the perceived ills of modern education. What exactly these ills are is not quite clear, but the assumption that technology can fix such ills defies logic, rational thought and empirical evidence. As we move into an era that is even more defined by technology, the need for a workforce skilled in the so-called 21st century skills is evident. This digital literacy demanded by these 21st century skills is not to the neglect of more traditional literacy, but instead build upon it. Educators have a duty to embrace technology and harness the opportunities it offers for the betterment of their students, but also need to ensure that using technology for the sake of it does not distract from the learning experience for the students. The use of technology, however, should not be forced upon educators by well-intentioned administrators or management. The literature suggests a strong link between educator beliefs, and in particular teaching philosophy, and technology use. The need for proper, targeted and fit-for-purpose professional development is evident, not the broad and generic training that is prevalent in the literature. For educators to believe in the value of technology, they need to experience the value of technology.

Creativity, collaboration and communication are some of these skills that are easily facilitated by modern technologies. But we must not become a slave to such technologies. Suggestions that teachers and educators will be no longer needed in this era of increasing technological society are easily rebuffed (Selwyn, 2017, p.123). No machine can replace the human aspect of learning, the social constructs that are so critical to learning and understanding. No amount of scripted, Behaviourist, drill-and-practice learning technologies can deal with the human side of learning, the debate, the uncertainty, the questioning, the diversity of opinions, the social nature of learning.

There appears to be a body of evidence to demonstrate that technology can play a role in the learning process. Collaboration in particular, appears to be a significant feature of such technologies. The immediate communication, easily accessibility of files irrespective of device used and mobile nature of devices has resulted in a shift of learning outside of the classroom, and indeed outside of the campus, to a time and place chosen by the learner (Sundgren, 2017). No longer is learning confined to the library, wherever there is an internet connection learning can take place. This democratisation of education is possibly the most evident impact that technology is having on education.

But an overwhelmingly positive view of technologies must to be tempered in light of the evidence that, particularly in higher education, personal technologies such as laptops, smartphones and tablets can have a significant negative impact on learning and retention when used in lecture theatres. There is ample evidence in the literature of studies that show the temptation to wander off task when using such devices in a lecture theatre is too great and is quite likely to happen. More worryingly, not only does opening a laptop in a lecture theatre distract the user, but it also has a detrimental effect on other learners in the vicinity. The impact is not just confined to the lecture theatre, but studies have shown it can have a detrimental impact on terminal exam results also. But an outright ban on personal technologies would be a regressive step. Finding that balance between facilitating learner use of such technologies without impacting learning is challenging. Mandating that all students must use a laptop or tablet device ignores the financial implications in an era of greater inclusiveness and access to education. One of the greatest challenges of educational technology is how the power of such technologies can be harnessed to nurture and develop the 21st century skills and to ensure that the workers of the future are equipped with the skills and attitudes necessary in a society that is increasingly reliant on technology. It is clear that this challenge is being addressed, but in a piecemeal fashion. It is also clear that we are only at the beginning of the journey and that the change will be evolutionary, rather than revolutionary. The challenge for educators and researchers is to develop a body of knowledge on educational technology and provide robust, empirical evidence as to how technology can be effectively used for the benefit of learners, with the hope that when these learners enter the workforce, it will be for the betterment of themselves and the wider society. An important aspect of this body of knowledge is the student perspective, notably missing from the

literature (Hämäläinen et al., 2017). In particular, the importance of learning outside of the formal environment of the classroom is only becoming apparent. It is within this context that the present study is situated, contributing to the body of knowledge an insight into what undergraduate students utilise their tablet devices for, where the devices are used, and how these uses fit into the broader learning experience, both formal and informal.

3 Methodology

3.1 Introduction

As I have discussed previously in Chapter 2, the very nature of educational technology is the subject of a substantial body of research. The nature of technology integration ranges from deep integration into the learning environment (e.g. see Stamm, Triller, Hohoff, & Blanck-Lubarsch, 2019) to nothing more than an organisational tool (Henderson et al., 2015). What is apparent from the literature is that in an effort to ensure methodologically robust research, a significant majority of studies involving personal technologies such as smartphones, laptops and tablets, are part of a formal institute-sanctioned initiatives (for examples see Castillo-Manzano, Castro-Nuño, López-Valpuesta, Sanz-Díaz, & Yñiguez, 2017, Gaudreau, Miranda, & Gareau, 2014,Gikas & Grant, 2013, Yang, Li, & Lu, 2015). A gap in the literature appears to exist in the student experience, where instead of being provided with devices to take part in a study, students purchase devices of their own volition and use these devices outside of any formal initiative and indeed with little or no knowledge of pedagogical practices. But in recognition of the dual context within which the student experience is situated, both on-campus and off-campus, in addition to the portable nature of the personal technologies, it provides fertile ground for a study of this nature to investigate.

The aim of this research is to investigate the phenomenon of students who purchase tablet devices for their own use during their studies at higher education, outside a formal institute programme. The primary focus of the study is to investigate what the students use the devices for, both in an academic and non-academic context, and build up a picture of what it means to be a student in a Higher Education Institution (HEI) that utilises a tablet device. With tablet devices relatively new to the market, educators are still at the exploratory stage in relation to how such devices can be effectively used in an educational context (Nguyen et al., 2015). This study will therefore contribute to the body of knowledge in this area, focussing on the undergraduate student lived experience.

This chapter commences with a self-reflection on the thought process of how I ended up with the chosen methodology, grappling with the encroachment of my positivist attitude into a world I ultimately found out I needed to explore with an interpretivist lens. I then take a look at the interpretivist concept of the Lifeworld and how this fits into the broader discussion of

the Lifeworld of the student, which is a powerful tool for exploring the lived experience. Following on from this is a description of Phenomenology and how this is a robust methodological philosophy used to capture the lived experience. A description of the selection criteria is followed by a discussion on Seidman's (2013) three-interview method and why it was chosen to capture the participants' experience. Furthermore, justification for the use of Phenomenology is presented, with an acknowledgement that this research deviates from "pure" Phenomenology and the rationale for doing so. The chapter continues with a discussion on the data management and how the themes emerging were arrived at.

3.2   Self-reflection

With an explicit acknowledgement of Guba's (1982) concept of practicing reflexivity in addition to Miles, Huberman, & Saldana's (2014, p.311) concept of providing "backstage" information, and a I now present a description of the journey I took to arrive at this point to undertake the research.

As a practitioner in the Information Technology industry who had made the move to academia, I brought with me a vehemently positivist perspective on the use and capabilities of technology. Influenced by the black-and-white binary representation of data, I sought a robust methodology to investigate the usage of tablet devices in higher education. There are a number of theories of technology use and adoption in various contexts (for example, see Venkatesh, Thong, & Xu, 2012; Venkatesh 2003) that appeared to offer a framework from which I could investigate student use of tablets. But as I set out the parameters of the study, it quickly became apparent that I needed a radical shift in mindset to successfully complete this investigation.

One of the key requirements from the outset was to ensure that the research would be device agnostic. The focus would not be on what device the student used, the focus would be in what it was used for and the context within which such use was situated. Of immediate concern was the very definition of use and how this could be measured. There is a significant volume of data that was available from the institution learning management system (LMS), Moodle, data that is particularly granular and could be used to build up a picture of student interaction. But then it became quite apparent that limiting the investigation to the LMS would provide a particularly narrow view of device usage, omitting a vast pool of rich data that would be

discovered by non-academic use. In addition, it would be reasonable to assume that participant usage of tablet devices would not soley be confined to interaction with the LMS.

Turning attention to software, it was technically feasible to install data-gathering software on devices for the duration of the research that would potentially provide that rich pool of data that would enable building up the picture of the lived experience. Immediately, a significant number of issues became apparent, not least of which was the device agnostic nature of the study. Developing custom software for the project would prove particularly costly in terms of time and resources, when multiplied by the number of different platforms that may be used by participants, it became quickly apparent that this was not an option. In addition, there were significant privacy and ethical issues around the parameters of software designed to collect data on usage.

It was at this point of the process that the focus shifted from the device itself and the technical aspect of the research, to the student. I had unwittingly focussed all my attention on the device, while losing sight of the true focus of the research – the student and the lived experience. But the question remained how to investigate, in an ethical and methodologically robust manner, the usage of tablet devices by students at a higher education institution. The challenge was to escape my positivist viewpoint and inherent biases to design research that would elicit that a rich data and enable me to build up that picture of the lived experience. Given the subjective nature of experience, it became apparent that I needed a discovery-orientated methodology from the interpretive paradigm.

One of the first methodologies considered, ethnography, appeared to offer a way to explore the everyday life of groups of people with a common culture, in this instance, the student experience. Relying on a thick description as observed by the researcher, it seemed plausible that it would be possible to construct a narrative around the life lived by students and the role tablet devices played in this world (Denscombe, 2017). More contemporary, 21st century-appropriate derivatives of ethnography have been developed, with concepts such as online ethnography (Bryman, 2012), exploring life on the internet via Kozinets' concept of netnography (Kozinets, 2015) and virtual ethnography (Hines, 2000). But ethnography is not just confined to observations (Miles et al., 2014). Other sources of data could be used to build up a rich description of the lived experience of students, including interviews and LMS interactions. However, it became apparent that ethnography, whatever form it took, was

unsuitable in this context. Taken to the extreme, inserting the researcher into the Lifeworld the students could entail following participants around and lurking at the back of their classes. It soon became apparent that an ethnographic study, whether the more traditional or virtual kind, would not meet the needs of study in this context. In particular, ethnography risked putting me, the researcher as the central focus of the research, with resultant implications for the interpretation of what I observed being biased by my own cultural and educational experience (Miles et al., 2014). In particular, being cognisant of my position within the institution as a Head of Department, it raised a number of both practical and ethical concerns in relation to inserting myself into the Lifeworld of the students in other departments of the institute.

The concept of developing a theory of tablet use amongst higher education students initially offered a promising line of inquiry, based on Grounded Theory (Cohen, Manion, & Morrison, 2011). With my own technical background, I believed I could investigate tablet usage and offer an unique perspective "without the cloak of neutrality and passivity" (Charmaz, 2005, p.511). Typically used to investigate practical, everyday scenarios while gathering the participant's point of view, the methodology is ideally suited to small-scale, context-dependent studies (Maxwell, 2012). It also relies on open-ended, semi-structured interviews, in addition to other data such as field notes to build up a picture of the phenomenon under investigation, with the theories emerging from the data. However, it then became apparent that developing a theory of tablet device use was at best naïve, at worst immensely ambitious. The intention to was not to develop a theory or concept such as the Digital Native (Bennett, Maton, & Kervin, 2008) or that of the Visitor/Resident theory of technology use (Wright, White, Hirst, & Cann, 2014). The intention of the study was to put the students at the centre of the research and use a robust methodology to investigate what students did with tablet devices, both on- and off-campus. Therefore, what was required was an epistemology that put these students and their experiences at the centre of the research, through which it would be possible to enter their Lifeworld (Moran, 2012).

3.3 The Lifeworld

The concept of the Lifeworld is common to a number of interpretivist paradigms (Moran, 2012). It is the conscious experience, as it presents itself to the experiencer, before it has been subjected to linguistic expression and conscious reflection (Moran, 2002). Containing both

subjective and objective constructs, it is the world experienced with the "natural attitude" which is in contrast to the philosophical attitude which directs a level of scepticism towards this world (ibid, 2002). The Lifeworld is inhabited by the experiencer, with its associated purposeful experiences, formed by intentionality and distinct from the positivist concept of the physical world. It is predicated on the basis that all experiences are valid as they present themselves, and that they are observed not in an objective sense, but in terms of their "givenness" (Giorgi, 1997). The very nature of the Lifeworld is therefore based on the subjective experience of the experiencer, from which meaning can be derived (Cilesiz, 2011). This concept of the Lifeworld provides an avenue from which the lived experience can be explored.

While an investigation of the Lifeworld could use a range of methodologies, Phenomenology offers a robust and methodologically sound opportunity to investigate the lived experience (Moran, 2000). Denscombe (2017) suggests Phenomenology emphasises the subjective nature of the experience, like other interpretivist methodologies relies on a rich description of the phenomenon under investigation, relies on the interpretation of such descriptions and, most importantly, the agency of the actors who are experiencing the phenomenon. While the methodology is particularly common in the caring professions (for example, see Dowling, 2007; Olausson et al., 2014; Sorrell & Redmond, 1997), it also lends itself very well to investigating the use of technology in educational settings (for example see Chan, Walker, & Gleaves, 2015; Cilesiz, 2011; Rose, 2011). Build around the concept of the lived experience, the methodology seeks to elicit what VanManen (2014) refers to as the pre-reflective experience, that is, the subjective experience of the experiencer, as it presents itself. Phenomenology does not seek interpretation or opinions from the experiencer on the experience, but a detailed and vivid recollection of the events as they occurred, while the implicit acknowledgement that such a recollection is a faithful reproduction of the phenomenon. It is also accepted that a pure phenomenological research study does not make any claims as to the generalisability of the findings (Cilesiz, 2011; Rose, 2011), contrasting with to Guba et al.'s (1982) concept of trustworthiness that explicitly equates the scientific concept of generalisability with the naturalistic concept of transferability. While the present study utilises core constructs of Phenomenology, it is intended that by developing the thick

narrative demanded of a naturalistic inquiry, that the issue of transferability of the findings will be addressed.

3.4   Phenomenology

Phenomenology was developed as a philosophical method to "bring certainty to a disintegrating civilisation" in the early 20th century by Edmund Husserl (Eagleton, 1983, quoted in Groenewald, 2004). It has been described as a radical way of doing philosophy, an anti-traditional method of getting to the truth and describe the phenomena as it presents itself to the experiencer (Moran, 2000). Husserl further developed the original work by Brentano and viewed Phenomenology as a rigorous science that aims not to seek causal explanations, but to describe (Moran, 2000). Phenomenology thematises consciousness as it presents itself to the experiencer, in "the totality of lived experience that belong to a person" (Giorgi, 1997). However, the exposition of the ordinary and the lived experience of that ordinary does not appear to be an appropriate context within which to undertake research. By placing the ordinary in the context of Husserl's concept of the "Lebenswelt" or Lifeworld, the lived experience is central to the elicitation of experiences and the meaning-making of everyday phenomena (Barnacle, 2004). Reality is understood through embodied experience in this Lifeworld of the experiencer (Starks & Trinidad, 2007) brought to the fore through writing phenomenologically (van Manen, 2014).

In an attempt to get a deep understanding of how undergraduate students utilise tablet devices during the attainment of educational goals, the need for a naturalistic, qualitative methodology is apparent. Getting to the core of the student experience necessitates a methodology that seeks to elicit rich data about the experience and one that puts the experiencer and the experience at the centre of the research. Phenomenology is one such methodology, one that is a systematic attempt to develop a deep understanding of the experience of a phenomenon (Cilesiz, 2010). Moran (2000, p. 4) defines Phenomenology as:

> *"…an attempt to get to the truth of matters…in the broadest sense as whatever appears in the manner in which it appears, that is as it manifests itself to consciousness, to the experiencer"*

The truth, in this case, is the experiencer's detailed description of the phenomenon, elicited through a series of in-depth interviews. Phenomenological research is typically discovery

orientated, meaning the researcher is seeking a deeper understanding of the phenomena, instead of having a pre-determined theory upon which the phenomena being investigated is based (Giorgi, 1994). Such an open-ended methodology provides freedom for the participants to give a detailed account of their experiences while acknowledging that no matter what their experiences are, they are still valid. Bryman (2011, p. 470) suggest that during such interviews, going off on tangents or even 'rambling' is to be encouraged in an effort to gather a deeper insight into the experience.

Phenomenology has evolved through the initial work of Husserl, developed as a theoretical framework and methodology for studying the lived experiences of a phenomenon (Cilesiz, 2010). Heidegger took the work of Husserl one step further by emphasising the uniqueness of the individual, the uniqueness of the individual's experience. Phenomenology, argues Giorgi (1994), is comprehensive, it starts from the perspective of the consciousness and whatever presents itself is considered legitimate. Though the comprehensiveness of the data gathered will of course depend on the recollection and articulation skills of the participant. The Husserlian notion that an experience is valid, no matter what the experience is, is a central tenet of the philosophy (Giorgi, 2002) . Priority is given to revelation and disclosure about the phenomena, as opposed to explanation, prediction and generalisability. Presuppositions of the researcher about the phenomena are bracketed, or put aside, no judgement on what is presented is made, irrespective of whether the researcher feels what is being presented is correct or not. The researcher is a "faithful witness to the accounts in the data" (Starks & Brown Trinidad, 2007) seeking to elicit the essence, or the characteristics of the phenomena.

As a significant portion of educational research in education is qualitative in nature, and as such, Phenomenology provides a robust theoretical and philosophical framework for engaging in such research (Cilesiz, 2011). In her study of technology for educational purposes used in internet cafés, Cilesiz (2010) argues that Phenomenology is ideally suited for research in technology in education due to its ability to comprehensively detail the experiences with technology in such situations. Phenomenology, however, provides an ideal methodology for such studies for another reason, as it is not focussed on the surroundings, the technology or other pre-determined criteria, but on the human experience and the context within which

this experience occurs. Accordingly, Phenomenology provides a clear framework for data gathering, analysis and interpretation.

A phenomenological study typically consists of three phases: (i) description, (ii) reduction and (iii) a search for essences or characteristics (Giorgi, 1994). The description phase is most commonly implemented in the form of a number of interviews that adhere to what Seidman refers to as the "In-depth, phenomenological interview" (Seidman, 2013). The three interviews will be distinct, yet related, with a concerted effort to elicit the context within which the lived experience sits. The guiding principle of these interviews will be to "keep the phenomenological intent of the interview in mind" (Van Manen, 2014). The phenomenological intent begins with the phenomenological attitude.

3.4.1 The phenomenological attitude

The concept of the phenomenological question, Van Manen suggests, may arise when we pause and reflect on experiences (van Manen, 2014). The "taken-for-grantedness" of everyday life implies little or no reflection on these experiences, yet reflexivity is central to the eliciting of meaning when investigating phenomena. The phenomenological question, therefore, is shaped in a deep-rooted wonder about a phenomenon that may not be present in the experiencer, but must be present in the researcher (van Manen, 2014). But the temporal nature of experience results in the "is" becoming the "was" (Seidman, 2013). An attempt to elicit the pre-reflective experience will always be fraught with danger as it is susceptible to the passing of time. The phenomenological attitude is therefore "an attentive awareness to the things of the world as we live them, rather than as we conceptualize them" (van Manen, 2014 p. 41). Consequently, by adopting the phenomenological attitude, it should be possible to develop an awareness of the lived experience and consequently derive meaning from that experience.

3.4.2 Agency

Heidegger introduced the concept of "being in the world" (Heidegger, quoted in Friberg, Claesson, Berndtsson, & Öhlén, 2007). People engage with reality, or at least their version of reality by being in a Lifeworld, their Lifeworld. Tangible entities, such as a tablet device, could be perceived as not just a physical device consisting of electronic components and a screen, but a an extension of a person's embodied existence (Merleau-Ponty, 2012). Intentionality is central not only to broader philosophy, but in particular to Phenomenology. Intentionality

reveals the world as it can be comprehended, grasped, or appropriated. (van Manen, 2014, p.64). Thus intentionality places consciousness, the self, or presence at the centre of the world. By engaging with people who display an agency of a particular phenomenon and listening to their narratives, it is possible to access their Lifeworld (Berndtsson, Claesson, Friberg, & Öhlén, 2007). From these Lifeworlds, it is possible to develop meaning through the next stage in the process, phenomenological reduction.

3.4.3   Phenomenological reduction

The Greek word epoche entails a suspension of judgement (Moustakas, quoted in Dowling, 2007). It is typically employed in Phenomenology to suspend the natural way of looking at things, to put aside any preconceived notions or presuppositions when encountering a phenomena (Norlyk & Harder, 2010). Van Manen demonstrates this concept when he describes a time he was walking through a park in the Autumn (van Manen, 2014, p. 216). As he walked through the fallen leaves, memories from his childhood came flooding back. He wondered, from a phenomenological perspective, if the memories were stored in the leaves, being released as he walked through them. He immediately notes that this would contradict his beliefs and knowledge as a scientist that memories are cognitive constructs and most certainly not stored in fallen leaves in a park. By engaging in the concept of bracketing, he notes how as a phenomenological researcher, he would put aside his scientific knowledge, presuppositions and beliefs and approach the concept of memories being stored in leaves in a park with a sense of wonder. This would enable him to elicit the meaning of an ordinary, everyday experience such as walking through fallen leaves in a park (van Manen, 2014). Husserl described the requirement for this suspension of knowledge and belief as the phenomenological epoche, in particular the need to bracket fundamental constructs to enable acts of consciousness to come to the fore (Moran, 2000). But in order to bracket presuppositions, it is necessary to make them overt and ensure they are articulated as clearly as possible (Dowling, 2007). This can be achieved by adopting the "phenomenological attitude", with practitioners actively questioning their presuppositions and biases and how they relate to the phenomena (Cibangu & Hepworth, 2016; Holroyd, 2001). Bracketing is particularly important when researchers have prior experience of a phenomenon, requiring they put aside or render non-influential prior knowledge so that the phenomenon can present itself as it is experienced (Giorgi, 1997). In my own case, having worked in the IT industry for many years, in addition to having a strong interest in tablet devices, I developed a sense of

awareness of my own position relative to the participants. Acknowledging my interests and experience, both professionally and academically, helped me understand how both the interview process and my analysis process could be biased. But rather than dismiss the interviewer as a troublesome instrument that may introduce validity threats, any research of this nature should recognise that an interviewer is an intelligent and adaptable human being that has an important role to play in the data gathering process (Seidman, 2013). By my developing an awareness and understanding of how bias may influence the conduct and outcome of the research, the risk from bias can be mitigated and a level of objectivity can be implemented.

Phenomenological reduction, therefore is a methodological device that helps make research findings more precise (Giorgi, 1997). It encompasses bracketing, but in addition, disregards the existentiality of a phenomenon and suspends past knowledge of the phenomenon to "encounter it freshly" (Giorgi, 1997). Combining reflection and writing, reduction enables the researcher to get to the core of the phenomenon under investigation and elicit meaning (van Manen, 2014, p.344).

3.5 Ethics

Ethical challenges occur at every step of the research process (Seidman, 2013). The notion of ethics is central to the conduct of any research and a researcher must be acutely aware of what Seidman notes is "doing good work" (Siedman, 2013, p. 139). Research involving human participants must be conducted in a manner that ensures the protection of the interests of the participants, where they participate entirely of their own volition and can withdraw from the research at any stage (Miles et al., 2014, p57). Descombe (2017) further suggests that participation may be based on the belief in the greater good and that a person "such as them" may benefit from the findings of the research at a future date. The present study was influenced by the guidelines of the British Educational Research Association, in an effort to ensure the research was carried out in an ethical, transparent and respectful manner (BERA, 2018).

3.5.1 Approval

In recognition of the fact that I was a student at one institution and an employee of another, I sought approval from both institutions' Research and Ethics Committees to undertake the research. Approval for undertaking the research was sought from Durham University School

of Education's ethics committee and was granted on the 26th of August 2016. In addition, a similar application was made to the ethics committee of the institute where the research was conducted, incorporating the approval from Durham University, and was granted on the 3rd of October 2016.

3.5.2 Informed consent

The concept of informed consent is a central tenet to any research on human participants and a cornerstone of ethical behaviour (Cohen et al., 2011). This concept ensures that participants are fully aware of what they are agreeing to participate in, what the aims of the research are and that the utmost will be done to ensure the protection of their personal data and their identity. The instrument commonly used to inform participants is typically a paper-based form and gives participants the opportunity to be fully informed prior to giving consent to participation (Bryman, 2012). During the present research, once contact had been initiated with prospective participants, they were invited to an initial, exploratory meeting. At this meeting, it was made clear that this was not the formal commencement of the study and was merely to ensure the participant understood the nature of the research, the context within which it was set, including the three-interview structure, the contact details of both the researcher and the researcher's supervisor and that participation was entirely voluntary. At the conclusion of this meeting, the prospective participant was given the informed consent form to take away, review and, if they agreed, to sign. Once the signed informed consent form was received, it was placed in a locked cabinet. Interview timetables were then generated based on participant and researcher availability.

3.5.3 Confidentiality

The use of pseudonyms is typically used to ensure participant confidentiality, however, does not always guarantee this confidentiality (Bryman, 2012, p. 136). In particular, as this research focused on students who used tablet devices during their studies, it is not inconceivable that due to the relatively low numbers of students who use such devices, that a reader may be able to deduce the identity of that student. In addition, a number of participants recruited were international students, again given the relatively low numbers of such students across the various faculties, it also raised the possibility of identification. Therefore in this study, three steps were employed to ensure participant confidentiality. The first was the use of Anglicised pseudonyms. In an effort to simplify the management of such names, pseudonyms

were chosen that had the same first letter as the participant's actual fist name. The second tactic employed was the generalisation of the programme of study the participant was undertaking and finally a generalisation of their nationality to continent. It is acknowledged that the risk to participants should they be identified is low, given the nature of the study and the subject matter being investigated. However, one possible area of risk was during a discussion that emerged concerning that of illegal content in section 4.10.3. In this section, the pseudonyms were removed to further protect the identity of the participants. In addition, it is acknowledged that there exists potential for a participant to identify themselves.

3.5.4   Power relations

Seidman (2013) notes that interviewers and participants are never equal. While the researcher cannot resolve the inequities of the relationship during the interview process, the researcher can, at an absolute minimum, be aware of such inequalities. Maxwell (2013) suggests the researcher examines the research from the participants' perspective, in particular asking themselves how the participants would view the researcher and how the power differences would influence the data gathering process. As the research was undertaken in the institute where I am employed, a particular note of concern was that my position as Head of Department strongly skewed the power relations in the interview process, with potential implications for the findings (BERA, 2018). Acknowledging this fact, I made the determination to exclude students from my own department for this research. In addition, all interviews bar one were carried out in a windowed meeting room, on a different floor to my own personal office in an effort to delineate between me in my role in the institution and my role as a researcher.

3.6   Selection Procedure

In any phenomenological study, it is imperative that participants have relevant and valid experience of the phenomenon under consideration (Seidman, 2013, p.20). In the present study, simply owning a tablet device was insufficient, participants needed to have experience in an academic setting, with the assumption that their use extends beyond the campus perimeter. Therefore, when recruiting participants, a requirement was set that participants had at least one academic semester (approximately 16 weeks) of use with the device to participate in the study. In an effort to ensure the study was device agnostic, it was also documented that the make and model of the device a participant used was not relevant, as

long as it conformed to a definition of a tablet device[1]. Details of inclusion and exclusion criteria are provided in Table 3.6-1.

3.6.1   Inclusion and exclusion criteria

Inclusion	Exclusion
Aged 18 or over and can therefore give consent	Does not meet one of the inclusion criteria
Enrolled on a full-time undergraduate programme	Is enrolled on a programme in the department of which I am head
English speaking	
Experience of at least one semester using a tablet device in an academic setting	
Willing to talk about experiences using their tablet device	

Table 3.6-1 - Inclusion and Exclusion criteria

With these parameters defined, the question then turned to recruitment and that of sampling. Purposeful sampling is used where participants are actively sought out that have substantive experience of the phenomenon under investigation (Guba, 1982). In addition, purposeful sampling demands that participants have both knowledge of the phenomenon under investigation and ensures the relevance of that experience (Denscombe, 2017). But a common question from researchers is what the ideal number of participants is for a study of this nature, a number that is difficult to quantify (Seidman, 2013). The discovery-orientated nature of a qualitative study may result in the need for additional data to build up a picture of the phenomenon under investigation, something which can be difficult to anticipate at the commencement of a study. The concept of saturation, when an interviewer begins to hear

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[1] The requirement noted that the device was to be greater than seven inches, had some form of network connectivity, utilised a touch screen and the primary use of which was other than making phonecalls

the same information repeatedly and no further insights into the phenomenon under investigation appear to be emerging, is a general rule of thumb when determining that sufficient participants have been recruited (Seidman, 2013). However, the specifics for determining whether saturation has been reached are rarely documented, therefore leaving judgements as to whether saturation has been achieved to the researcher (Bryman 2012).

3.6.2   Participant recruitment

Recruitment consisted of a number of different strands. The first was a poster that was created by the researcher and posted at strategic positions around the institution. In addition, the poster was emailed to the Student's Union who sent out a bulk email to all students with a copy of the poster attached. Finally, colleagues of the researcher were approached asking if they were aware of any students in their class who used a tablet device and might be interested in participating. All participants were incentivised by entering them into a draw for a €50 voucher. A total of twelve students responded via email with initial queries. After an exchange of information, a total of six confirmed that they met the criteria and were willing to participate.

After interviewing the six initial participants, I was of the opinion that the data collection would benefit from some more participants. Two more participants were subsequently recruited and interviewed at which point I felt that the information garnered from the participants was not significantly different from previous participants and therefore saturation point had been reached. It was at this point that I determined sufficient participants had been recruited and interviewed.

A profile of each participant is now presented, in addition to the type of tablet device they have used. While participants represent a notably broad and diverse group and could arguably be representative of the student population of the institution, the participants were self-selecting and therefore no conscious effort was made on the part of the researcher to recruit such a diverse group. However, while the research borrows from the concepts of Phenomenology, in particular in relation to the methodology used, noting that the goal of such a study is not the generalisability of the findings, it is not inconceivable that similarities with a student cohort in a comparable Higher Education Institution (HEI) would be found. Though caution must be exercised as Phenomenology is characterised as discovery orientated, and the intention is to describe and derive meaning from the experiences of the

participants, rather than develop any kind of theory. Accordingly, the phenomenological method makes no claims as to the generalisability of the results (Cilesiz, 2011, Seidman, 2013, Van Manen, 2014). However, this study will deviate somewhat from this method and present the findings as transferrable to comparable contexts in comparable institutions.

In addition, while the findings are and attempt to interpret the experiences as they present themselves to the experiencer, this research further diverges from the phenomenological philosophy and presents a conceptual model of what it means to be a student at a HEI using a tablet device.

3.7   Participant Profiles

A short profile of each is now presented to set the context for the findings. All names are pseudonyms and identifying attributes (such as country of origin or course being studied) have been generalised. All participants were enrolled as full-time students on their respective courses.

3.7.1   Beatrice

Beatrice is a mature student, with adult children and grandchildren and is studying a creative technology course. Having left school early and worked in a manual job for most of her working life, Beatrice decided to return to education to study initially a two-year programme, with the option of continuing on to further study. While her husband was hospitalised, her adult children purchased an iPad for her to facilitate communication between the two of them. This initial experience with the iPad was positive, with Beatrice commenting the "…iPad is so much simpler". During the course of the interviews, a particularly novel use of the iPad during her studies emerged that formed the cornerstone of her experiences while studying.

3.7.2   Christopher

Christopher is in his late teens, from a Scandinavian country and studying on a three-year graphic design programme. He has been living in Ireland for a considerable time and is a strong proponent of technology in both his personal and academic life. Initially using an iPad 2, he found it ineffective for his studies, but when he discovered the iPad Pro, he notes the difference was "like night and day". While he uses his device for general activities such as music and internet browsing, it is his use of the stylus that emerges as a key enabler of his creativity.

3.7.3 Clara

Clara is Asian, early twenties, attending the institution for one year studying accounting, having previously studied for three years in her home institution. She has owned her Samsung Galaxy Note for three years and uses the device extensively for a range of information management and organisational tasks during her studies. While a proponent of such technology, demonstrating strong evidence of use in an academic setting evident, Clara is also acutely aware of the limitations of her device.

3.7.4 David

David is Irish, early twenties and in the third year of a four-year science programme. He emphatically describes himself as not being a technology enthusiast, with his device purchased for him by parents upon completion of secondary school. He has an older model iPad for which he found a particularly unique use during laboratory work. In addition, he has lived with a number of international students and demonstrates another particularly unique use of Google Translate.

3.7.5 Jennifer

Jennifer is in her late teens and uses an iPad mini. After trying a number of other courses in other institutions, she is studying to be an accounting technician. She goes to lengths to explain how she is the first in her family to go to college and the challenges she has experienced. She is somewhat passive about the value of such technology in an educational environment but uses the device extensively at home for balancing academic and non-academic life, resulting in the emergence of a number of novel uses.

3.7.6 John

John is originally from the UK but living in Ireland a number of years and uses a 10-inch Windows tablet. He describes himself as a technology enthusiast and puts himself through college via freelance graphic and web-design work. He speaks at length about these external activities and how he balances the demands of those with the demands of the course he is studying. He sees the value of technology in an educational environment but is also acutely aware of the limitations of such technology.

3.7.7 Rodger

Rodger is in his early twenties, Irish and is in his final year of an honours degree in the area of computing. He uses a 10-inch Android tablet and is a keen technology enthusiast, evidenced by the extent to which technology permeates every aspect of his life, both academic and non-

academic. Emerging from the interviews with Roger are strong views on the role technology can play in the student lived experience.

3.7.8   Richard

Richard is Asian and unlike other Asian students who typically come to the institution for one academic year, he has enrolled on a four-year program and is supporting himself with various part-time jobs. He is studying a business-related subject and uses a Microsoft Surface Pro 3 tablet. Richard speaks extensively about how he spent considerable amount of money on a device with heightened expectations of how the device could help his studies, but during the course of the interviews, it became quite apparent that the device did not always facilitate his learning as much as he hoped it would.

A summary of participant attributes is presented in Table 3.7-1.

Name	Age classification[2]	Ethnicity	Area of study	Device
Beatrice	Mature	Irish	Creative Technologies	Apple iPad
Christopher	Regular	EU	Graphic Design	Apple iPad Pro
Clara	Regular	Asian	Accounting	Samsung Note Pro Android
David	Regular	Irish	Science	Apple iPad
Jennifer	Regular	Irish	Finance	Apple iPad
John	Regular	UK	Computing	Windows
Rodger	Regular	Irish	Computing	Samsung Android
Richard	Regular	Asian	Business	Windows

Table 3.7-1 - Participant Attributes

3.8   Data Collection

The Lifeworld is the source and object of phenomenological research (van Manen, 2014). To undertake empirical research, Phenomenology demands a rich narrative, a detailed and vivid description of the phenomenon under investigation, as faithful to the original experience as possible (Giorgi, 1997). The subjective experience is critical to the eliciting the lived experience and deriving meaning, with participants detailing their prereflective experiences. Participants are asked to give a detailed description of their experiences of the phenomenon as it presents itself to the consciousness of the experiencer (Giorgi, 1997). In particular, the researcher has to be careful not to solicit opinions, perspectives, perceptions or interpretations of the experience, but a detailed and vivid recollection or reconstruction(van Manen, 2014). As Husserl puts it, the interviewer is to go "back to things themselves" (quoted in Groenewald, 2004).

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[2] Rather than listing out ages, it was considered more prudent to present them as categories

Seidman suggests a three-interview process consisting of semi-structured interviews (Seidman, 2013). While this may at first seem to conflict with Van Manen's concept of the phenomenological interview, it is primarily the second interview that takes this format. This model is conducive to supporting the concept of a validity check where the third and final interview can be used to confirm with the participant that the interviewer's recording of the data is correct (Groenewald, 2004). Greasley and Ashworth (2007) suggest it is possible to become immersed in the Lifeworld of a participant using the three-interview method, with each successive interview giving both the participant and the researcher time to reflect on both the experience and the interview process. There is an overlap between the three interviews as demonstrated by Figure 3.8-1.
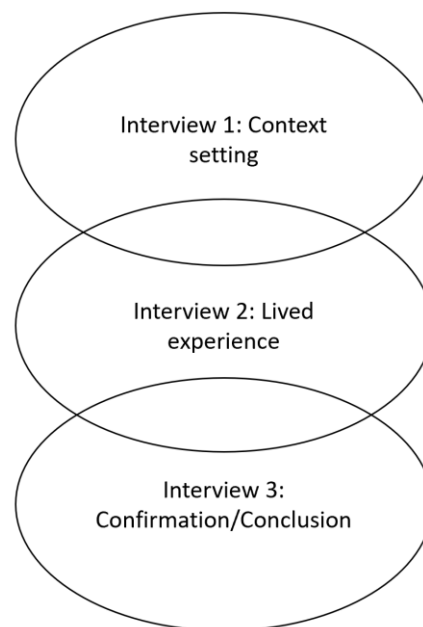
Figure 3.8-1 - Seidman's three-interview structure

An attempt was made to ensure the interviews in the present study were spaced at least one week apart to ensure that there was sufficient time for participants to reflect on the interviews, but not too much time to lose the momentum of the process (Seidman, 2012). The first interview was used to set context, eliciting information about the participant and the context within which the lived experience takes place, information without which, Seidman suggests, it would be impossible to explore the meaning of. Seidman suggests that this interview is used to determine how the participant got to where they are right now and

explores their motivations and background to their experience of the phenomenon under investigation.

The second interview elicits the detail of the experience of the phenomena under investigation. Aside from the standard practices used during qualitative interviewing, this second interview, while semi-structured, is not looking for an opinion on the phenomena or any kind of commentary or interpretation, but a detailed description as the experience presented itself to the participant (Van Manen, 2014, p.314). The second interview builds on the first by delving into the experience of the phenomenon. Utilising the context garnered from the first interview, the researcher can target specific questions of relevance to the participant and to the phenomenon under investigation. Rather than asking the participant to reflect on their experience, the researcher encourages participants to recollect in detail experiences of the phenomenon. Bryman suggests that during such interviews participants wandering off on tangents should not only be tolerated, but also encouraged (Bryman, 2012).

The final interview reviews the previous two interviews to ensure that the researcher has captured the essences of the experience correctly and allow for the participant to make any necessary corrections (Groenewald, 2004). It also affords the participant the opportunity to add anything of relevance that was not covered in previous interviews.

3.9   Interview Timetable

The interviews were scheduled over a number of weeks, from February to April 2017, the details of which are presented in Table 3.9-1. Audio recordings were created using a Samsung S7 smartphone and immediately transferred to an encrypted hard drive of an office computer. In addition, handwritten notes were taken during the course of the interviews, which were stored in a locked cabinet in my office.

Participant	Interview Date	Duration	Notes
Beatrice	20/03/2017	41m 58s	
	29/03/2017	45m 04s	
	03/04/2017	38m 10s	
Christopher	30/03/2017	-	Audio not recorded for this interview due my forgetting to hit the record button. However, detailed notes were taken
	03/04/2017	1h 9m 18s	
	05/04/2017	34m 2s	

Clara	06/02/2017	36m 23s	
	13/02/2017	1h 0m 29s	
	20/02/2017	37m 12s	
David	08/02/2017	31m 23s	
	22/02/2017	1h 23m 43s	
	01/03/2017	39m 55s	
Jennifer	07/02/2017	28m 37s	
	09/03/2017	45m 48s	
	14/03/2017	31m 38s	
John	06/02/2017	35m 10s	
	20/02/2017	1h 5m 46s	
	27/02/2017	31m 56s	
Rodger	09/02/2017	35m 30s	
	23/02/2017	1h 16m 01s	Interview held in my office due to double-booking of interview room
	28/02/2017	38m 30s	
Richard	08/02/2017	30m 2s	
	15/02/2017	37m 2s	
	22/02/2017	29m 58s	

Table 3.9-1 - Interview Timetable

3.10 Deviation from pure Phenomenology

Seidman notes that there is "no single approach to interviewing that could be called phenomenological" (2012, p.15), suggesting there was an opportunity to adapt various methodologies to suit a particular piece of research. I was conscious of the philosophical underpinnings of phenomenology and the fact that as a methodology, it has been used profitably in educational technology research (Cilesiz, 2011). The search for the lived experience in this study was guided by the phenomenological question, while I was consciously aware of maintaining the phenomenological attitude discussed in section 3.4.1. Gathering the prereflective experiences of participants provided a rich and detailed narrative that participants believed was true to their immersion in their own Lifeworld and resulted in a number of occurrences of VanManen's (2014, p.320) concepts of rhetorical gems. However, VanManen (2014, p.315) also cautions about participants speaking *about* their experiences rather than conveying their experiences of living *through* the phenomenon. While this

distinction is particularly blurred, I felt that it would unnecessarily constrain the participants and go against the ethos of permitting the participants to ramble, as espoused by Bryman (2012). In addition, Van Manen (2014, p.299) also comments that phenomenological analysis cannot be performed on a narrative that is not pre-reflective or experiential in nature, therefore suggesting analysis would dependent upon the participants ability to vividly describe their pre-reflective experiences. This increasingly became an area of concern for me as I anticipated that even the very notion of a pre-reflective experience might pose and unwanted obstacle for participants.

There was an evident tension when it came to the generalisability of the findings. VanManen (2014, p.352) comments that empirical generalisations cannot be drawn from phenomenological studies, yet the context for the research suggests that it would provide opportunities for transferability to comparable contexts – undergraduate students in a HEI using tablet devices. This tension needed to be addressed in manner so as not to undermine the methodology used, but to also ensure that the data that emerged was subject to robust analysis that would yield valid results. Miles et al. suggest a number of ways to achieve an opportunity for transferability, such as the presentation of a thick narrative, a detailed description of the sampling techniques including any possible limitations and the findings include suggestions where they could be tested further (2014, p.314). Considering these factors, the decision was taken to deviate from pure phenomenology and focus on a more trandition concept of iterative data analysis and deriving meaning from the data.

3.11 Data Management and Analysis

In an effort to "get closer to the data", I made a decision to transcribe the interviews myself rather than relying on a professional transcription service (Bryman, 2012, p.486). This facilitated in part the holistic and intuitive understanding of the data (Holroyd, 2001), with subsequent readings of the data to be completed once the full interviews had been transcribed. Each individual interview was transcribed into a single document, with the resultant three being combined into one large document per participant. During the transcription process, I engaged in what Maxwell (2013) refers to as forming ideas on "what you see in the data", making notes of possible codes to capture what is contained within the data. These ideas formed the basis for the first pass of both categories and subcategories (or codes) that are discussed in the next section.

VanManen (2014) suggests there are three stages to the reading of data. The first is the wholistic approach where the transcribed interviews are treated as a whole and the broader picture of the lived experience is explored. He then suggests a selective approach where the text is read a number of times, asking "what phrases are revealing about the phenomenon" (van Manen, 2014, p.320). During this second reading, Van Manen suggests looking for "rhetorical gems", phrases that are particularly evocative and reflective of the unique nature of the participant's lived experience. In this study, a number of novel uses of tablet devices emerged that are analogous to these "rhetorical gems". These are explored in greater detail in the Findings chapter and are referred to as "nuggets" and convey a sense of uniqueness to this study, uncovering novel and context-specific uses that convey the broader essence of the lived experience.

Van Manen then suggests a final, detailed reading of the text, down to the sentence level, to permit the phenomenological experience to show itself in the text. This was undertaken by re-reading the text a number of times, highlighting key phrases and paragraphs and making handwritten notes in the text where I felt it contributed to the lived experience of the participant. While VanManen notes that coding, empirical generalisations and conceptual abstractions can never fully capture the insights that Phenomenology demands, he still acknowledges that in a research study such as the present one, utilising such techniques can give an insight into the lived experience. With this in mind, I now explain the thematic analysis process I utilised.

3.11.1 Categorisation

The very act of creating codes for thematic analysis suggests a strong element of reflection on the data collected and that this reflection can act as an anchor for deeper analysis and the search for meaning (Miles et al., 2014). Yet there is an implicit statement about the data being made, a statement Maxwell (2013) suggest could in fact be wrong. Given the subjective nature of experience that is the cornerstone of a study of this nature, the codes are the researcher's interpretation of the data as it presents itself, with the implicit acknowledgement of such subjectivity. Therefore it is not uncommon for the initial codes evolve and change during the analysis process.

Having transcribed the interviews and consolidated the three interviews into one master document, I again re-read the individual documents to get what VanManen (2014) suggests

is an immersion into the data. Taking hand-written notes, it became clear that there were common activities, thoughts and perceptions of the participants that began to emerge. Maxwell (2013) suggests that such "organisational categories" act as "bins" in which to group similar codes. A first pass of high-level categories were therefore created which are presented in Table 3.11-1 below.

Category	My notes
Traits of SRL [Self Regulated Learning] or SDL [Self Directed Learning]	Note on this one: none of the participants can be said to demonstrate all the characteristics of self-directed learners. But there are some (admittedly a small number) of traits emerging from participants that suggest should the research be targeted accordingly, a better picture might emerge
Technology use	- Use of technology, including what I am calling nuggets: unique uses - Could probably be broken down further into hardware (for example, add-ons such as a stylus) or software (for example, communication, sharing, collaboration, research)
Policy	- Where policy could influence use - Where policy did not influence use
Software	The use of specific pieces of software
Self	Perceptions/thoughts/impressions/profound statements

Table 3.11-1 - First pass at categorisation

While I noted these categories appeared to emerge out of the data, upon reflection I felt that the categories were broad, but did not capture the varied nature of the uses to which the participants put their devices in both their academic and non-academic life. However, acknowledging that they would probably change as I further continued the analysis, I accepted them as a starting point. The progression and modification of these categories is detailed in the Nvivo change log in Appendix B.

To attempt coding, a set of what Miles, Huberman & Saldana (2014) call first generation of codes were developed. These codes are presented in Table 3.11-2 below. The codes represent my initial thoughts of what the data contained and how the participants reported various

aspects of device use, resulting from both listening to the audio recordings and the numerous readings of the composite documents. Again, these were developed with full acknowledgement that they would change and evolve somewhat during the analysis process. This evolution is also reflected in the Nvivo change log, an excerpt of which is presented in Appendix B.

Code	Description	Code	Description
Profound Statement	profound statement, worthy of noting	Stylus	using the stylus
Nugget	nugget of information on how the participant uses technology in a unique or novel way	Finger	using the finger
Frustration	expression of frustration with technology	Keyboard	using the keyboard (virtual)
Technology Failure	technology failure, where it failed at a key time	Headphones	using headphones
Organisation	organisation using technology, as in, an institutional example of where tablet technology is encouraged and used	Peripheral/Other	other peripheral (including physical keyboard)
Time Management	time management using technology (see paper from Selwyn on this one)	Email	using email
Phone Laptop Tablet	Phone, Laptop, Tablet – where participant has all three	Facebook	using Facebook
Unique	unique use of tablet (tablet specific, for example, Google Translate can be used on a range of devices – that is not unique to a tablet. However, using the touch features of a tablet in a given scenario would be regarded as unique to a tablet)	Facebook Messenger	Facebook messenger
SDL	evidence of Self directed learning, or components of	WLB	work/life balance (maybe better phrased as academic/life balance? Using the tablet for both academic and non-academic use. Not sure about this one. Might need more clarity)
SRL	Self-regulated learning, or components of	Perceived Effectiveness	perceived effectiveness of a technique

Missing Capability	missing the potential to utilise a capability (where using the likes of FB Messenger to share files, when they could do it much easier with the likes of OneDrive)	Environmentally Conscious	environmentally conscious. See Tree Hugger, Hippy.
Following On Screen	following lecturer's slides on projector, on personal device. Participant has lecturer's slides open on their own device, as the lecturer progresses through, participant advances local copy.	Dipping in	dipping in to some activity on the tab, in short bursts
Happy	feelings of happiness with some aspect of the technology	Demo	showing people (staff/fellow students) work (as opposed to using a phone/laptop to demonstrate the work)
Staff says No	staff (academic, support) express a negative sentiment towards the technology		

Table 3.11-2 - first pass codes

3.11.2 Coding

Through a series of iterative steps, the following category codes emerged settled on the codes as shown in Figure 3.11-1 below.
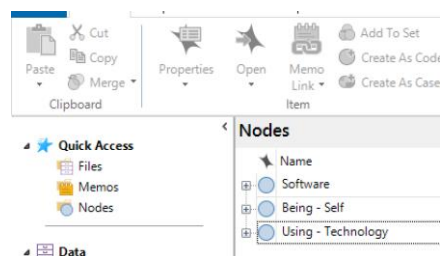
Figure 3.11-1 - Category Codes

The evolution from the initial categories to the three above is evidenced by the NVivo change log in Appendix A. These category codes were further subdivided into second cycle codes or pattern codes (Miles et al., 2014, p.86) that capture the patterns emerging from the data.

The *Software* category was seen as fundamental to the use of the tablet – the hardware is rendered usable by the software that is installed on it. The initial data analysis suggested that the majority of the software used by participants either involves communication, collaboration or information retrieval. When explored further, this evolved into the sense of connectedness that is an everyday part of participant's lives. These final pattern codes in this category are presented in Figure 3.11-2 below.
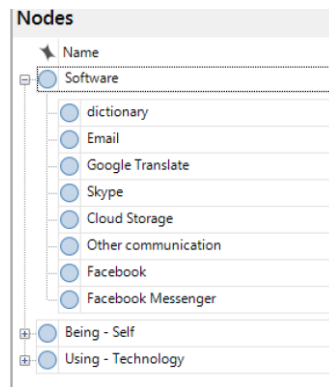
Figure 3.11-2 – Software Category codes

The second category, *Being - Self*, emerged from the various uses of technology and emanates from the sense of "being" a student. From the initial analysis of the data, it was apparent that the use of the tablet devices varied between off-campus and on-campus use. The Being category, therefore, emerged as uses of the device that are the self-actualisation of being a person, using the device in two distinctive capacities – academic and non-academic. The pattern codes used to capture this sense of being are presented in Figure 3.11-3 below.
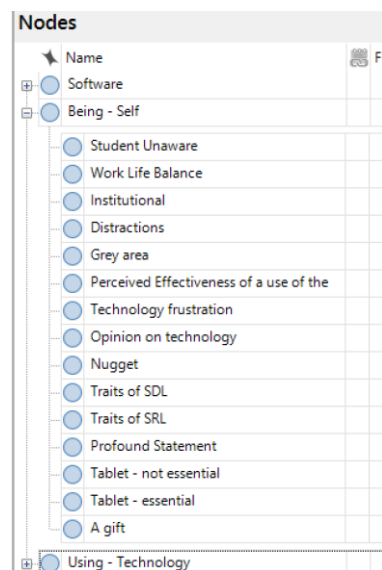
Figure 3.11-3 – Being – Self Category codes

As can be seen from the codes that evolved, they are entirely concerned with the person, whether that person uses the device in a personal or an academic capacity.

The final set of codes that emerged were classified under the *Using – Technology* category. These codes relate to specific instances of the lived experience, as expressed by the participants. Again, it is apparent from the codes that there does not appear to be a

delineation between academic and non-academic. However, such was the volume of overlap that in a number of cases, delineating was warranted in subsequent analysis. The codes in this category are shown in Figure 3.11-4 below.
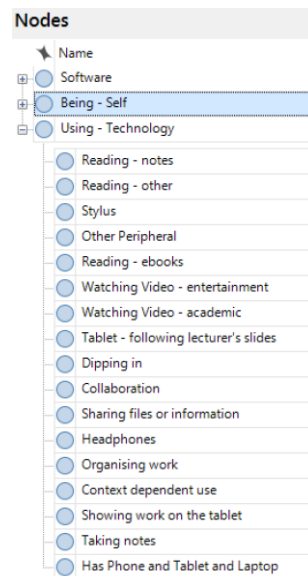
Figure 3.11-4 - Using – Technology Category codes

3.11.3 Thematic analysis

The themes emerging are represented by the evolution of the categories. Some of the initial categories were removed as they were deemed irrelevant and only applicable in specific cases, others were modified and honed throughout the process. Policy, for example, initially appeared as a category initially intended to represent the fact that there appeared to be a failure of policy in relation to the students' induction to the institution. This was initially evidenced by the fact that a number of students were unaware of the supports and software available to them when using their tablet devices. Upon reflection, it was decided that that since there was not an actual policy on the use of tablet devices, this data point was better captured under the Software category, and the "institutional" code. Another code, "finger" was initially conceived as it was anticipated that the use of the tablet devices would be predicated on the use of the participant's finger. However, this proved to be irrelevant and did not appear in the context of the anticipated use and was consequently removed. Other superfluous codes were amalgamated into more relevant and descriptive codes, such as, in the case of the "Happy" code that was subsumed into "Perceived effectiveness of the use of a tablet".

The three category codes, Software, Being – Self and Using - Technology represent the themes emerging from the data. The pattern codes that emerged form a robust foundation from which the analysis was undertaken. Miles et al., (2014, p.93) also suggest the use of an "analytic sticky note" to make notes of ideas that emerge during the analysis of the data. These notes, they suggest, capture the "fleeting" and "emergent" thoughts on the data. I used the Memo feature of the NVivo software extensively to capture such thoughts, a sample of which are presented in Figure 3.11-5 below.
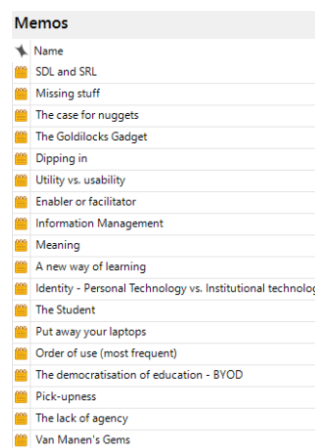
Figure 3.11-5 - Memos on the emergent themes

3.12 Trustworthiness

The nature of reality presents a problem for any interpretivist researcher, with each participant presenting their version of their reality (Guba, 1982). Coherently gathering, analysis and interpreting such realities depends on a significant level of subjectivity, that is tempered by Lincoln and Guba's four key components of trustworthiness (Schwandt, 2015).

3.13 Credibility

Credibility has been described as the "That's right!" moment (Miles et al., 2014, p.313) where an assertion has been made and the recipients can not only relate to the assertion but are also in agreement with it. Such an assertion will have been built up by engaging with participants of the study, particularly over a prolonged period of time. This need for prolonged engagement with participants is necessary to gather the rich data necessary to build up a picture of the phenomenon under investigation (Maxwell, 2013; Miles et al., 2014; Schwandt, 2015). Sustained and multiple data gathering efforts help smooth out often contradictory and incomplete data, ensuring immersion within the environment in an effort to build up the picture of the often contradictory realities as interpreted by the participants.

The use of Seidman's (2013) three-interview model also facilitates the concept of member checking (Miles et al., 2014; Schwandt, 2015). In this study, the third interview commenced with a review of what was captured in the previous two interviews, offering participants an opportunity to confirm that what was captured in the previous two interviews was accurate interpretation of the participants' experiences. However Maxwell (2013) cautions that such member checking is no more valid than the actual data gathered during the interview process, it is more to be considered as evidence as to the validity of the interviewer's interpretation of the data gathered. A sample of a third interview, demonstrating member checking, is presented in Appendix 4.

3.14 Transferability

Phenomenological writing demands a detailed and vivid description of the phenomena under investigation (van Manen, 2014). This writing is a detailed description of the context and derived meaning from the data gathered, with the thick descriptive narrative providing an opportunity for the reader to consider whether the findings are applicable to their own setting (Miles et al., 2014, p. 314). Yet there is an inherent contradiction with pure phenomenological writing and the concept of transferability to other settings. One of the inherent difficulties with any phenomenological study is taking a small number of cases and attempting to understand the broader context within which they are set (Giorgi, 2002). Phenomenology makes no claims as to the generalisability of findings, but seeks meaning that may be applicable to the wider world, while being limited to a specific context and circumstance (Cilesiz, 2011; van Manen, 2014, p. 352). It is within this context that this study deviates somewhat from pure Phenomenology and adopts the more traditional positivist concepts of a naturalistic enquiry where it is suggested that the findings may be transferrable to other contexts.

3.15 Dependability

Dependability demands an audit trail that details the processes by which the data was collected, analysed and interpreted (Guba, 1982). In this study, the trail consists of a wide range of items that are available for audit and would ensure the required transparency and auditability. These include items such as a detailed description of my role and status within the context in which the research has been undertaken, the participant recruitment posters, informed consent forms, audio recording and transcripts of interviews, chronological

interview notes, handwritten and electronic notes detailing the thought processes, personal communication with both participants and others involved in the recruitment of the participants and the Nvivo software logs documenting the evolution of the various coding strategies and "notes-to-self". In addition, a detailed description of the research design, the methods used and the analytical processes used presented in this document should ensure a sufficient level of dependability, auditability and transparency.

3.16 Confirmability

Confirmability is analogous to the quantitative concept of objectivity (Miles et al., 2014, p. 311). It is the manner in which the researcher maintains, as much as possible, a distance from the research participants and acknowledges explicitly any biases that may exist. Maxwell (2013) suggests there are threats to validity that a qualitative researcher needs to be aware of, but also accept that are impossible to eliminate. One such threat, bias, is an inherent aspect of the human side of the interview process.

In addition, (Miles et al., 2014) suggest that the researcher provides detailed "backstage" information, including details of all steps followed and procedures used. It then follows that the sequence of events from data gathering to meanings being derived can be clearly followed and audited.

3.17 Validity

The literature around Phenomenology speaks extensively about the concept of validity (Giorgi, 2002). Validity is an effort to measure the extent to which an instrument designed to investigate a phenomenon actually measures that phenomenon (Bryman, 2012). But the very concept of measurement suggests a positivist construct in an interpretivist world. The subjective nature of experience does not lend itself well to objective measurement. Furthermore, qualitative researchers contest the epistemological underpinnings of the concept of validity and its appropriateness to interpretivist studies (Seidman, 2013). Giorgio suggests that one threat to validity in phenomenological writing is the fact that it is essentially what he calls a "pen and paper affair" (Giorgi, 2002). In writing about a phenomenon, the writer is not, and most likely has not, experienced it. And when meanings are elicited, it raises the question as to whose meaning it really is (Maxwell, 2013). No matter how hard an researcher tries, it is evident that she is inherently part of the interviewing process (Seidman,

2013). By virtue of the fact that an interviewer is exploring the subjective experience from within the Lifeworld of the participant, the question of threats to validity must be addressed.

One such threat to validity is reactivity (Maxwell, 2013). Acknowledging that the researcher is inherently exerting influence on the participants by virtue of the fact that she is innately invested in the research is key to mitigating such a threat. As with bias, reactivity cannot be eliminated, but openly acknowledged and accepted as a feature of the research. It can be countered during the interview process by tactics such as avoiding leading questions, tolerating silences and noting non-verbal clues as to the participant's thinking (Maxwell, 2013; Seidman, 2013; van Manen, 2014).

But even when acknowledging bias and reactivity, Seidman (2013) asks how we know if the participant is telling the truth. How do we ensure that participants do not modify their responses to questions in order to, as Miles and Huberman suggest, appear amenable to the researcher (Miles et al., 2014)? Seidman contends that the three-interview process neatly counters such a threat through internal consistency. Such a structure guarantees a level of consistency between the three sessions. If there was significant difference between the three, it should become immediately apparent to the interviewer which can be rectified. In addition, non-verbal clues can suggest the participant is thinking carefully about the answers, with stumblings, searching for words "oohs" and "Ems" indicative of such a thought process (Seidman, 2013).

3.18 Summary

This chapter aims to provide the context within which I, as the researcher, came to be where I am currently and why I chose the methodology that I did. It is implicitly acknowledged that while Phenomenology offered a robust philosophy from which a phenomenon such as student use of tablet devices could be investigated, this study is not a pure phenomenological study in the truest sense, rather borrowing from elements of Phenomenology while adhering to a more traditional concept of a interpretivist investigation. By selectively operationalising appropriate techniques, such as Seidman's (2013) concept of the three-interview structure, Miles et al.'s (2014) framework for coding and thematic analysis, in addition to adhering to Lincoln & Guba's (1986) framework for ensuring quality, this research study should provide a coherent and robust insight into the lived experience of students in higher education that utilise tablet devices.

4   Findings

4.1   Introduction

This research sought to explore what it means to be a student at a higher education institution using a tablet device, underpinned by the philosophy of Phenomenology. The research is purposely device-agnostic, the make and model of device used is of secondary importance. A baseline description of device functionality was set to ensure some level of comparability and to provide a common basis for eliciting participant experience. Usage of specific software applications is also of lesser importance, with the quest for meaning focussing on the actual objectives of activities undertaken within the context of the learning environment, rather than what type of software was used to achieve these objectives.

This chapter presents the findings from research conducted with eight full time, undergraduate students at a HEI in the Midlands of Ireland that were self-identified users of tablet devices during their studies. Of the eight, one participant was classed as a mature student, the remainder were of school-leaver age, or above. Two participants were from Asia, two were from the European Union and the remainder were of Irish ethnicity. The interviews were conducted between February and April 2017.

4.2   The findings

The study was directed by the research question as follows:

What is the lived experience of undergraduate students using tablet devices?

From this context, the phenomenon of the lived experience was at the forefront of the investigation, with participants detailing their use of their tablet device. Almost immediately emerging from the data was a duality of use within the context of their device. Participants spoke about the use of various pieces of software, which formed the emergent property of communication and ultimately, *using*. In parallel, the activities participants were using the software and their devices for built a picture of them being – being a student, *not* being a student, staying in touch with friends and family. Participants *used* their devices while *being* a student, with the fluidity of definition of each term being context dependent. *Using* emerged through the myriad of ways participants described their use and the context within which theses uses were situated, almost entirely predicated on particular pieces of software. But *using* was not confined to the campus and academic uses. As I will explore, the concept

of *using* permeated all aspects of participants' lifeworlds. *Being* emerged as the alignment with the use of the device and the research question. The lived experience suggested the very nature of being for the participants was that of being a student. But also emerging was the non-student lifeworld of the participants, with the evidence suggesting the delineation between both was particularly blurred.

4.3 Undergraduate Students using Tablet Devices

To reduce the complex social interactions and tablet usage of an undergraduate student to a relatively simple representation is to risk doing a great disservice to the innovation, creativity and determination demonstrated by the participants of this research. Developing a generic, all-encompassing and concise description of the participants is a not unsubstantial task, such is the diversity of the uses that have been revealed by this research. However, notwithstanding this diversity, there are common themes that have emerged that provide a robust foundation for the depiction of what it means to be an undergraduate student using a tablet device.

The model presented in Figure 4.3-1 is a summary of the findings, identifying two core themes that emerge from the data – Using and Being.
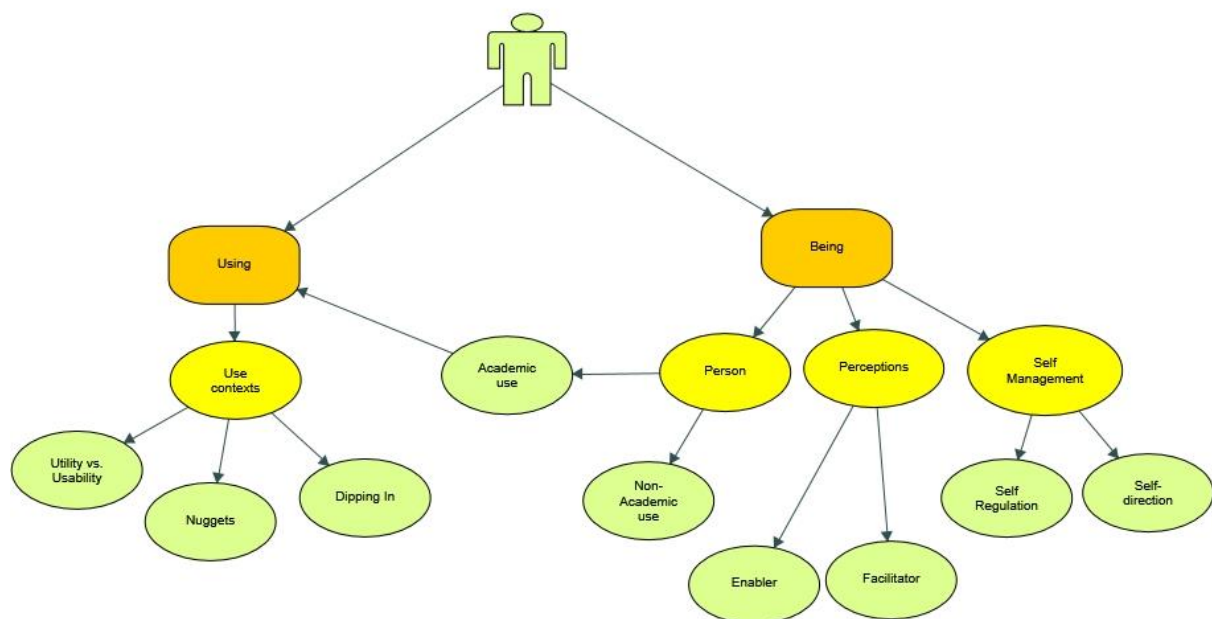
Figure 4.3-1 - Using and Being

The model in Figure 4.3-1 above demonstrates the core elements of what it means to be an undergraduate student using a tablet device. At the centre of the model is a representation of the participant – the student. To the left and right of the student are the two strands of the model, Using and Being. Relating this back to the Research Question, which asks "What is the lived experience of undergraduate students using tablet devices?" these two elements map directly to the concept of the lived experience (Being) and using a tablet device (Using).

The left-hand side of the model, Using, introduces the concept of *Use Context*. This represents findings that depict a device that is neither too big, nor too small, but perceived by participants as being "just right". The concept is further subdivided into the core elements of *Utility vs. Usability*, *Nuggets* and *Dipping in* which will be explored later in this chapter.

On the right-hand side of the model, Being, presented are three main concepts of being a student. The first of which is that of the person, the second is that person's perceptions of their device and finally that person's activities that could be classed as self-management. The link between the person, in particular the node titled *Academic use* is linked back to the left-hand side of the diagram, to represent the fact that the person is also a user of the technology in an academic context. These concepts will be explored in detail in section 4.4.

4.4   Using vs. Being

The concept of using, while at one level obvious, represents a theme that emerged from the research representing some of the core activities undertaken while using a tablet device. From the intention to use a device at the commencement of studies, to the novel uses and the behavioural changes and opportunistic nature of some activities, to the use of the device as core to the learning, the range of uses are notably diverse. Any attempt to broadly categorise a usage pattern would lose insight into what a student does and achieves while using the device. Therefore the theme of "Using" has been further subdivided to give a better understanding of what it means to be a student using a tablet device.

Using a tablet device is but one aspect of the findings. Being a student is, however, undefined within the context of using a tablet device. Being a student that is engaged in using a device evoke images of a technically-savvy, computer-literate and connected youth that has clear

educational goals and objectives and knows how to achieve them using technology. However, as I have discussed in section 2.9, the notion of the technically-savvy student is lacking empirical evidence. In addition, commentators such as Flanigan & Kiewra (2018) suggest that notions of this type of students should be emphatically rejected. The findings emerging from the participants suggest that they demonstrate a certain level of technical competence, but not necessarily extensive technical competence. What does emerge are a range of common themes and common uses associated with tablet devices, in addition to a diverse range of uses to which devices are put.

In line with Venkatesh et al.'s (2012) concept of facilitating conditions, users typically have perceptions of what a device can do for them and how they can achieve a task with such a device. These are represented by *Perceptions* in the model, representing what participant perceptions are of device functionality and how they believe it can be effectively utilised to further their educational goals.

Nuggets are the unique, novel and innovative uses of the tablet device by participants which are presented as comparable to Van Manen's (2014, p.320) "rhetorical gems". These are uses that in most cases could be achieved using another device (such as a mobile smartphone or a laptop), but within the context of the learning environment, the tablet is used for a number of reasons. In contrast to the concept of nuggets, there are other activities that are what might be expected uses of a tablet device, such as watching videos, browsing the internet and engaging with social media. These are explored in the context of the broader lived experience and how they contribute to the meaning of being a student.

Dipping in is an emergent theme almost universal across all participants. Frequently, the "instant-on" feature of the tablet device facilitates activities such as the quick checking of email, looking up information, or, in more than one case, on a short subject-centric activity or a burst of creativity. This was consistently mentioned as a particularly attractive feature of tablet devices by participants. These uses of the tablet device are contrasted with other activities such as checking a smartphone for messages or missed calls, activities that are more cursory, more frequent and less engaging.

Participants in this study were undergraduate students in a higher education institution. Once outside of the campus and the learning environment, participants never ceased being

students. The contrast between student life and personal life was evident in the many uses to which the tablet devices were put. Not only were they used outside of the campus for academic purposes, but they were also used for non-academic, primarily entertainment, purposes. In one particular case, the device was used to learn a language, a use completely unrelated to the programme the participant was enrolled on. The contrast between academic and non-academic use of the tablet device is particularly noteworthy.

One of the emerging themes under Being, is whether the tablet device is an enabler of learning or a facilitator. Five out of the eight of the participants deemed the tablet device to be critical to their studies, stating that they could not manage without it. This raises the question as to whether the participants simply cannot see the utility of other devices such as laptops, or whether the tablet devices have become so ingrained in their learning activities that learning would not take place without the device.

While it could not be claimed that any of the participants conform entirely to Zimmerman's (2002) concept of a self-regulated learner, there was emerging evidence of participants displaying some attributes of self-regulation. Activities such as making lists, self-testing, researching beyond the core texts and requirements of a programme of study were evident. While this study did not expressly seek to investigate such traits, it is an area for further research. In addition, the use of earphones is presented as an analogue to Zimmerman's concept of restructuring the physical and social context to achieve learning goals.

The difference between usability and utility was somewhat evident. Participants were acutely aware of the potential of their tablet devices, as demonstrated through uses such as "nuggets". The participants were evidently proficient in utilising the devices to their fullest potential, tempered with an evident awareness of the limitations of the tablet and the need to revert back to devices such as a laptop when undertaking more involved activities such as report writing.

The present study uncovered a number of key themes in relation to the contrast between the use of tablet devices compared to laptops. One clear theme emerging is the physical attributes of laptops in comparison to tablet devices, with the tablet device offering a balance between battery life and portability.

4.5   Why a tablet?

The institute at where the research took place does not have a formal requirement for students to purchase any personal technology device such as a laptop or tablet. Access to the wireless network is provided using student network accounts. In the present study, three out of the eight participants purchased the device themselves, the remainder had the device purchased for them by a family member. In a number of cases, where the device was purchased for them, participants had an input into the purchasing decision.

Christopher was immediately interested when he got to experience the device:

I went into the Apple Store and I saw this and I was, like, just blown away

Beatrice comments how her adult children purchased an iPad for her upon her return to studies:

No, my two children bought it for me.

Other, younger, participants comment how their parents purchased their devices for them:

…so my mother bought me the iPad. (David)

Mam and Dad bought it for me for my birthday last year. (Jennifer)

I got it as a gift from my Mam for Christmas. (Rodger)

The question of motivation for the adoption of a device is a common theme in a number of technology adoption frameworks. The Unified Theory of Acceptance and Use of Technology 2 is a modified theory of technology adoption and use, specifically for the consumer market (Venkatesh et al., 2012). One aspect of the model consists of performance expectancy, defined as the degree to which using the device will provide benefits to the user. However, in above five cases, the user is not the purchaser of the device, so it raises an interesting question as to the perceived performance expectancy of such devices in the broader consumer market. Chan-Olmsted and Shay found in their research on consumer adoption of tablet devices that the number one attribute for the purchase of such devices was perceived usefulness (Chan-Olmsted & Shay, 2016).

The concept of perceived usefulness is further reinforced by the responses of those participants who purchased the devices of their own volition.

When asked for his reasoning behind the decision to purchase his tablet device, John has a clear use in mind:

> *Because I could actually take notes on it and it would save me bringing in a heavy bag every day.*

In addition, John runs a graphic design business on the side and wanted a device that would facilitate him doing such work:

> *Interviewer: would it be fair to say that the reason you chose….you specifically wanted Windows was specifically for ….*
>
> *John: ….graphics…*

Note-taking is also a factor in Richard's reason for purchasing a tablet device. In particular, he views paper notes as excessive and has a preference for electronic notes:

> *Interviewer: …What were the factors that made you think… "Oh, I want a Surface" [Microsoft Surface Pro device]?*
>
> *Richard: Well, em, because when I was in Foundation in [my home country], I always had to print out my notes…And it's extremely annoying. And I can't type my notes fast enough…*

In addition, Richard comments on how the drawing functionality with a stylus device appealing to him:

> *And I used to do Foundation in science, where there are a lot of drawings and stuff like that. And when I saw the advertisement [for the device], I was just like "Wow"…[I was] …blown away.*

In exploring his reasoning further, Richard was asked if he had considered devices from other manufacturers:

> *Interviewer: you bought a Microsoft Tab, why not an iPad or why not an Android tab?*

Richard: Because the iPad is totally useless. It's a rip-off…I mean like, it's, I think, for entertainment. Unless you are talking about the iPad, the latest… the latest thing. But still, I don't know if the Microsoft Word comes free on iPad, yeah, you have to pay for it. So it's not worth it.

He further elaborates and shares more of his views on other devices:

Richard: And Android, if I am not mistaken, they are kind of….laggy.

Interviewer: I'm sorry…. The what?

Richard: Kind of laggy… like my phone is laggy now… I mean that's the reputation.

It appears Richard is clear on his reasons for buying the device he did and the reasons for not looking at other manufacturers. Aside from the utility of the device, it also appears to be a personal preference:

Yeah, but I still like the Microsoft better. That's the thing. Like when it comes to academic stuff like serious stuff, I need Microsoft. I don't want Android or other stuff.

However, having used the device for a year and a half, his opinion has changed somewhat on the particular brand and model:

But if you want me to choose a tablet again, that runs on Windows Operating system, I wouldn't buy Microsoft Surface because it's too expensive. I would buy, like maybe, Asus…those kind of…..same thing, same function. Asus is a good choice.

Frustrations with technology is another recurring theme that will be explored later in this chapter. While her reasoning for purchasing the device is not apparent, Clara is not as emphatic about her use of the device, commenting that she is not a technology enthusiast and certainly does not get excited about technology:

Interviewer:…do you get excited about technology?

Clara: Excited, I don't, um, not really….

Clara is in her third year of studies and has her device three years. While her device has a stylus and software for note taking, she expresses a preference for paper:

> *Clara: I saved the [electronic, written with stylus] notes, then after the class, I go to the library and print out the notes and then copy down what I [wrote]..Because I prefer paper than tablet.*

Clara appears to use the tablet on an ad-hoc basis when convenient and it appears that she uses the tablet more because it is there and still working, rather than having a specific use in mind for it. However, she comments how other students appear to be impressed with her use of her device:

> *Clara: …one of my friends asked me if it was worth to buy a tablet and then my other friend said "Yes, see [Clara], how she uses the tablet."*
>
> *Interviewer: and how did that make you feel?*
>
> *Clara: So proud. [laughs]*
>
> *Interviewer: Really? Why?*
>
> *Clara: Yeah, because I had made a right choice to buy a tablet.*

The perception of peers when a participant uses a tablet device emerges in a number of cases. Beatrice appears to feel that fellow students are staring at her when she brings her iPad into class, which resulted in her leaving it at home:

> *Beatrice: The iPad, I generally leave it at home, because you look a bit…. Everybody else is on their phone, and I'd be on an iPad. No, I don't bring it in that often.*

She seemed particularly reluctant to elaborate on what she believed other students' perceptions were. However, John offers an alternative perspective, suggesting that his peers are intrigued at what his device can do:

> *John: But as much as I have had it since first year, people don't understand that you can write on it, you don't need paper…People think "Oh, that's new technology" And I'm like it's been out for years, people just don't know about it.*

The fact that tablets are viewed as a curiosity suggests they are still a novelty in lecture theatres. John suggests that the handwriting aspect is possibly the more novel aspect, perhaps due to the use of a stylus.

When questioned about what other devices participants had, all reported that they had a smartphone and a laptop in addition to the tablet device. When asked what other devices they had, participants were unanimous in their replies:

> *Eh, a HP laptop. I bought that last year…Other than that, I have the phone (David)*

> *I have a Samsung Galaxy S4…I have a laptop as well. (Rodger)*

> *Just my phone and my laptop (Jennifer)*

Chan-Olmsted and Shay found that of the participants in their study (n=379), 96.8% of respondents owned a smartphone and 41.8% owned both a tablet and a smartphone (Chan-Olmsted & Shay, 2016). They suggest that although not all smartphone users own tablets, almost all tablet users also own smartphones. The study also finds the concept of substitutability as a key reason for purchasing a tablet, specifically perceptions on how their tablet device can substitute functionality for a laptop. Yet implied in the current study is that by virtue of the fact that all participants have three devices, substitutability does not appear to be a key factor, with the tablet device appearing to be more complimentary rather than a substitution. While it would be apparent a student could manage with just two devices, the smartphone and the laptop, it raises the question as to what inspired participants to purchase an additional device.

As would be expected in a study such as this, perceptions of the tablet device, from a self-selecting group of participants are broadly positive, however, not overwhelmingly so. There is an acknowledgement of the usability, utility and mobility features, to name but a few, but also evident is a frustration with technology, a tacit acknowledgement that the perfect device is yet to be designed. But defining what the perfect device is appears to be difficult, particularly when participants were asked to describe their ideal device, many struggled to do so.

Beatrice suggests that a combination of the physical attributes of her tablet device, in addition to the perceived simplicity of the user interface leads her to believe that:

> *it's simple to bring the iPad around the place, with you, and learning from YouTube how to do something much more easily that using the computer*

When discussing the ability to read electronic material on the device, she is equally as effusive:

> *there's an ebook and it's much handier on the iPad to be looking at an ebook than it is on the computer.*

When discussion evolves into talking about developing a portfolio for graphic design, Christopher notes that:

> *And in terms of making a portfolio, I find the iPad being the best thing. The best form of…bringing my work together. Through pictures, which I take with the iPad – which is fantastic. A fantastic camera. Through Photoshop, which I have on the iPad, along with Illustrator, the Graphic app, you can just save what you have made, and just bring it into the Notepad Plus.*

He reserves particular praise for the Apple Pen:

> *Making those fine lines you would be able to make with any other kind of pen. The Apple Pencil is so… it's so fine.*

Perceptions play an important role in the decision to purchase a tablet device, an example of the perceptions of peers playing a role emerged with this example from Clara:

> *Because at the time, one of my friends asked me if it was worth to buy a tablet and then my other friend said 'Yes, see Clara, how she uses the tablet.'*

And after using the device for three years, Clara is pretty clear about her decision to make the purchase:

> *Yeah, because I had made a right choice to buy a tablet.*

When asked to differentiate between his use of the laptop compared to the use of the tablet, David comments:

> *the tablet because it is so versatile and more….kind of….flexible in your hands.*

Jennifer suggests the use of electronic books (ebooks) would be a benefit of tablet devices:

> *If you look at everybody wandering around the college, they probably have three or four books in their bag…as well as two or three notepads and folders, and*

everything. Whereas, if they had all that in one device they could hold in their

hand, or put into a handbag, they are not going to carry around the books

It is interesting to note that this comment is purely perception of what the tablet device could do, as opposed to what it is actually used for. During this research, limited evidence emerged of ebook usage, aside from where academic staff had created their own and provided them to students. In terms of note taking, only limited evidence emerged of such activities taking place.

One example of such activities is John, where he was particularly adamant why he purchased his tablet device:

Bought it purely for college, the tablet.

When probed as to why he purchased it, it became apparent that he had a clear use intended for his device:

Because I could actually take notes on it and it would save me bringing in a heavy

bag every day…copies. I can just take all the notes on my … tablet.

Continuing on this strand of the conversation, it emerged that it was not just for academic use that he purchased the device, he had particular views on what he wanted it and why he needed it:

Eh, I wanted a Windows tablet and I wanted it to have a Wacom digitiser.

Interviewer: you specifically wanted Windows was specifically for ….

John: ….graphics…

This participant commented that he had a graphic design business on the side.

Continuing the theme of the influence of others in decisions to purchase tablet devices, Rodger notes that one of his lecturers uses a tablet device extensively:

…one of my lecturers has a Surface Book that he brings in and plugs in to everything.

It's much handier for him to do that.

The use by the lecturer of a tablet device appears to have given Rodger a positive perception of what the device could do for him, which resonates with the findings of

Asikainen & Gijbels (2017) that suggest instructors can be a significant influence on students in relation to the use of educational technology use.

A point he subsequently articulates:

> *when I was coming to college last year, I had a fairly long commute in the morning for a walk. This weighs 10% of what my laptop does, plus charger, plus everything, you know. It's that bit more convenient for me. Because one of the things a lot of people ask me is why are you bringing in this and not the laptop, I was just like "do you need it during the day". If you are not doing assignments, then there is no need.*

4.5.1.1   Physical attributes

Ting (2012) found that students became increasingly frustrated with the limited computing power and small screens of smartphones. Tablets, however, come in a range of sizes, from approximately seven inches to approximately twelve inches, suggesting that they may be more suited for use by students in an academic context. The larger screen size (in comparison to smartphones) is an obvious benefit, as Beatrice comments:

> *And it is so much easier to follow it than it is on a small screen [on a phone].*

> *and you have something that is a readable size.*

Christopher comments on the physical size of his iPad Pro (12.1 inches) how it facilitates his graphic design:

> *For maybe vectors, it doesn't pixelate anything, you can expand it to any size you want, which is very good for graphic designers.*

A number of participants commented on how they would rather carry the tablet to class than a laptop:

> *because tablet is easier to carry and then…is small… (Clara)*

> *Dragging around the laptop, taking it out of the case, setting it up (David)*

> *I wanted it for taking notes, because I was sick of carrying so many heavy copies of so many things, a copy for every single class… So, I go the tablet, it was greatest invention ever. I could just bring this one tablet around, and not have a big heavy bag every day with me. (John)*

> *Reading a journal, or typing up assignments, I use the tab, because it is light, easy to carry. (Richard)*

The physical attributes are not just limited to the classroom, or carrying it around all day, though. A number of participants commented on the convenience of the physical size when undertaking other tasks. Jennifer draws the comparison between a phone, a tablet and a laptop for reading:

> *It's handy to have in bed, like I wouldn't have the laptop in bed trying to read a book. And the smartphone is too small when you are tired and going asleep….It's too small to concentrate. So it's just like the size of a book, really [the iPad]*

Clara comments on how in her living quarters, she has limited space, so the tablet is used in preference to the laptop:

> *I don't have the space to write with a computer [laptop], but if [I use the] tablet, it is very small.*

Beatrice draws comparisons with her use of a computer when engaging in a learning activity using YouTube:

> *If you want to actually, you know, it's simple to bring the iPad around the place, with you, and learning from YouTube how to do something much more easily that using the computer*

The physical attributes of tablet devices also appear to facilitate larger battery sizes, which also emerged as an important feature for participants.

4.5.1.2 Long Battery Life

Having a device that can be used throughout the day emerges as a key theme in the participants' lived experience. Features such as battery life appear to be important when making decisions on what model to buy, as John replies:

> *One big factor was battery life, actually. There was one….. it was higher spec, but worse battery life…But I'd rather get the battery life out of it rather than the spec.*

The lower battery life of a laptop appears to be one of the reasons to use a tablet device:

> *And yeah, but the thing of a laptop is that the battery life is not as long…. (Richard)*

Rodger comments how he can get almost a full day using his device:

…it's got a six, seven hour battery…

As if to emphasise the importance of battery power Rodger even has an extra battery power pack, should his tablet battery run out:

That just shows the battery is there to be used. I also have my … I have a full battery bank…that can get me two full charges of it as well.

He continues, noting how the physical size of a laptop results in a physically bigger batter and therefore longer battery life:

Not only that, but the big ones tend to have a greatly improved battery, because there's more space.

When John is asked why he uses his tablet device over his laptop, he comments:

Mainly for the screen of it, the battery life, it's got very good battery life….it's like 8000 milli-Amps, it lasts 8 hours screen-on time.

Because the laptop, having it anywhere, it's just like it burns through the battery.

In particular, John gives the example of when watching videos, he has a preference for his tablet:

..that's what I would use the tab for. I wouldn't use the laptop. Battery life is terrible. They don't make laptops made for batteries these days, they might as well just build PCs.

When asked why the preference for using a tablet over her laptop, Clara draws a comparison between the battery life of her laptop and the tablet:

Because I don't have to go open my laptop, and sometimes my laptop maybe has no battery, I still need to go to connect, the battery, the cable, and then the tablet is there

A number of participants, when asked about what improvements could manufacturers make to devices, mentioned the battery:

When I study, I use it a half day, when I study and listen to music, the battery is….[gone]… So the battery, I think has to improve. (Clara)

Em, like, I'm not saying it is bad, but maybe the battery, make the battery better

(Christopher)

…really good battery, they would have to have a good battery (Jennifer)

The need to use a device for a full day, and even into the evening appears to be a consistent theme amongst participants. But while participants acknowledged that battery life on their tablet devices were generally acceptable, it is evident that in order to gain even more utility out of their respective devices, even longer battery life is a desirable feature.

4.5.1.3   Software availability

Physical attributes aside, tablet devices are no different from any other computing device, providing comparable features in a more portable format. One of the key factors in the success of devices, in particular, the Apple iPad, was the availability of software. No longer was it required to visit a computer store on the high street, software could be purchased and downloaded directly to the device. While the features of software were not explored in this research, discussion around what activities participants engaged in with their devices inevitably gravitated towards functionality provided by such software.

The social media platform, Facebook, was used by all participants. In line with Davis & Jurgenson's (2014) concept of context collapse, participants report that use of the platform appears to vary between general personal use and academic use, with, in most cases, little delineation.

Beatrice suggests that it is a requirement for her programme, in the creative technologies, for keeping in contact with classmates:

But, you know, I am doing a course, you have to be on Facebook.

In a notable delineation between personal life and academic life, she notes:

I have my Facebook on my iPad, I don't ever put it on my smartphone or anything else.

When asked how friends and family communicated with her during her year away from home,

Clara replied:

> *through Facebook, WhatsApp, WiChat*

Jennifer notes how she prefers to use Facebook on the tablet:

> *I find it so much more useful than just having the laptop*

But when personal life and academic life collide, Facebook appears to provide an ideal medium to keep peers informed. When asked for a specific example of where he would have used Facebook to communicate with classmates, Christopher replies:

> *last week I was out, so I said "sorry lads, I won't be in, let the lecturers know." And they let the lecturers know.*

Facebook appears to be an ideal medium for one to many, or even many-to-many communication within student groups, with all participants reporting that they were members of some form of class group on Facebook:

> *so we set up this Facebook group, and……I don't want to be the class rep that just dominates and says "this is the way the class goes", I try to put polls up, and this, that and the other. I try to make everyone kind of understand where everything is at one time. (David)*

The use of Facebook extends beyond informal groups within classes, with respondents suggesting it is an effective medium for mass-communication with students:

> *The [student] elections that were on here yesterday, were coming up, so I was reading everyone's manifestos and things like that. (Jennifer)*

Communication emerges as a key use of the tablet device, with half of the participants reporting that they use the Skype software. What is evident is that the majority of use of the Skype software is for informal, social use:

> *It is very easy to Skype (Beatrice)*

> *Em, the personal thing… Skype would be with my father…mainly because he travels abroad (David)*

However, a number of examples of more formal use emerged. One example is where a

participant uses it as part of his groupwork with fellow classmates:

I use Skype call for group project the other time. (John)

And another where another participant used it to engage in job interviews:

I'd use it fairly often now. Industries now, is huge. There's almost a Skype interview every three days. (David)

Taking it even more formal, one participant relays how he uses Skype to communicate with clients when engaging in his part-time graphic design business:

If I have client meetings or anything I find an empty room [in the college]. I fire up Skype and call them, I wouldn't actually do any [external] work in college. (John)

With communication comes strong evidence of collaboration. File sharing of project work emerged as an almost universal theme, with participants reporting a range of file sharing activities using various methods:

I'd have things on Google Drive and I would share. (Beatrice)

And we would share things through Facebook, where I would be on the iPad as well. (Beatrice)

Yeah, so like sharing files, sharing work folders, Google is in fact particularly good for that (Rodger)

Ok, what I really use a lot is OneDrive. (Richard)

When asked about project work, it is noted that the process involves:

…brainstorming and then share it via Facebook or OneDrive. (John)

The key pieces of software used appear to utilise the collaborative and communication aspects of the devices. Facebook and Facebook Messenger (Facebook, n.d.) appear to be the most popular, with other communication software including Skype and WhatsApp utilised on occasion for communication. The sharing of project files also appears to be a significant feature of the use of tablets, with files being shared through a combination of social media and cloud storage technologies. What is noticeable, is how little software is used for more involved work, such as writing reports. The lack of a physical keyboard, plus the limited user

interface of tablet devices do not facilitate extensive typing, and it is here the clear delineation between laptop and tablet use become apparent. However, in one or two specific cases, the physical attributes and associated software lend itself particularly well to graphic design and other occasional work, classified in this research as *Dipping In*. This will be explored at length later in this chapter.

4.5.1.4   Instant on

One of the most striking contrasts between the use of laptops and tablet devices that emerged from this research is the duration between when a participant presses the "on" button and when the participant can commence using the device. The fact that a tablet device was never actually switched off was not apparent to participants and the sleight-of-hand used by manufacturers to give the illusion of a device switching on almost instantaneously appears to be particularly effective in portraying a positive perception of the device.

When asked about the one thing she enjoys about her iPad, Beatrice replies:

> *I suppose, just picking it up and getting the news instantly. The fact that you don't have to log into anything*

The immediacy of the device is perceived as a significant benefit by most of the participants, with comparisons drawn between tablet devices and laptops:

> *If that was the laptop, it would have been 4 o'clock by the time I got it up and running. (Jennifer)*

> *We have to do our bits and pieces. We were just sitting in the canteen, you know, there are no sockets, didn't want to open up our laptops, it takes so long (Rodger)*

Jennifer notes how the instant on feature is useful for a quick email in the morning:

> *…well this morning when I sent an email, the iPad was just there…and the laptop was in the schoolbag, so I said I'll just get that [the iPad]…hit the button and it's on.*

In this time of instant gratification, the ability to pick up a device and have immediate access to a range of functionality, from communication and collaboration to news and academic work, appears to be a key benefit for participants. The instant on feature of tablet devices facilitated the emergence of the theme of *Dipping in.*

4.6   Using

I now explore the two sides to the undergraduate lived experience, commencing with *Using*.
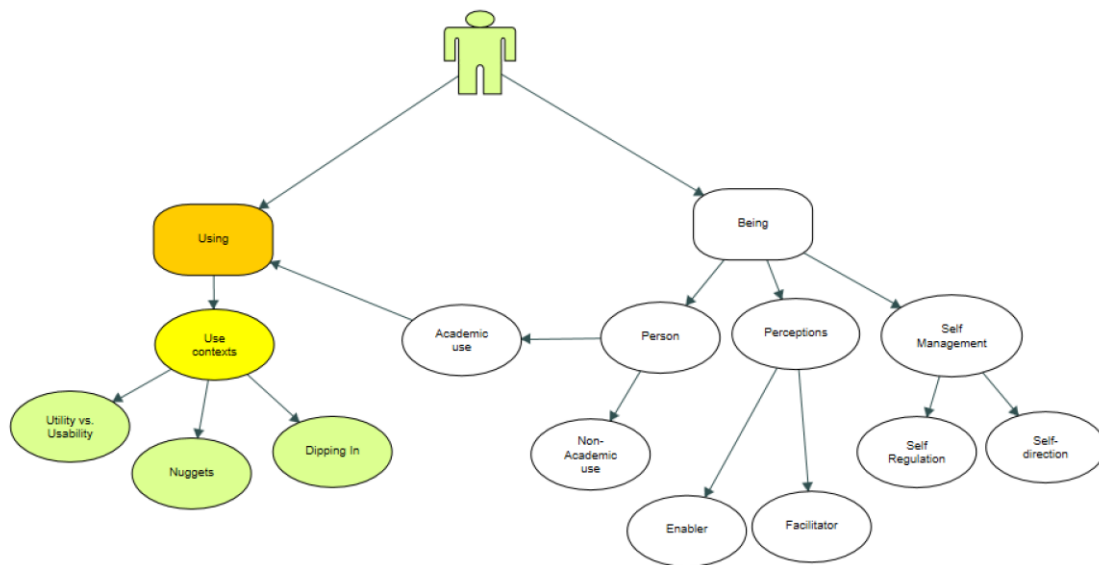
Figure 4.6-1 - Using the tablet device

4.7   Using – Utility vs. Usability

There appears to be a contradiction in the use of tablet devices emerging from this research. On the one hand, participants report that they use the tablet extensively in a number of related and novel ways, yet there is an obvious frustration with the technology. An emerging sense of compromise is evident, between utility and usability of the tablet device. The physical attributes appear to be not too big, not too small, but just right. While the screen size is suitable for working on, it is acknowledged that more involved work will be carried out on the laptop. If there is one aspect of tablet use that defines the participants of this study, it is the unique and novel uses to which tablet devices are put – nuggets.

4.8   Using – Nuggets

For the purpose of this research, the concept of a nugget is defined as a unique or novel use of the tablet device in the context of the lived experience of being a student. This contrasts with a use of the device that would be expected, for example, watching a video or browsing the internet. These nuggets are analogous to what Van Manen calls "rhetorical gems" (van Manen, 2014, p.320).

Figure 4.8-1 below presents a depiction of nuggets that emerged from the participants. While it is acknowledged that a lot of the nuggets described below could be achieved with another

device (in particular, a smartphone), it is the physical size and the characteristics of the tablet device that appear to facilitate such utility. For example, one participant relays the nugget of where he uses his iPad to take photographs through the eyepiece of a microscope. This particular nugget could quite easily have been achieved using a smartphone, but the resulting photograph would have to be transferred and incorporated into a report document. Whereas, when the participant took the photograph with the tablet, that photograph could be immediately incorporated into the report that was being written on the tablet device.
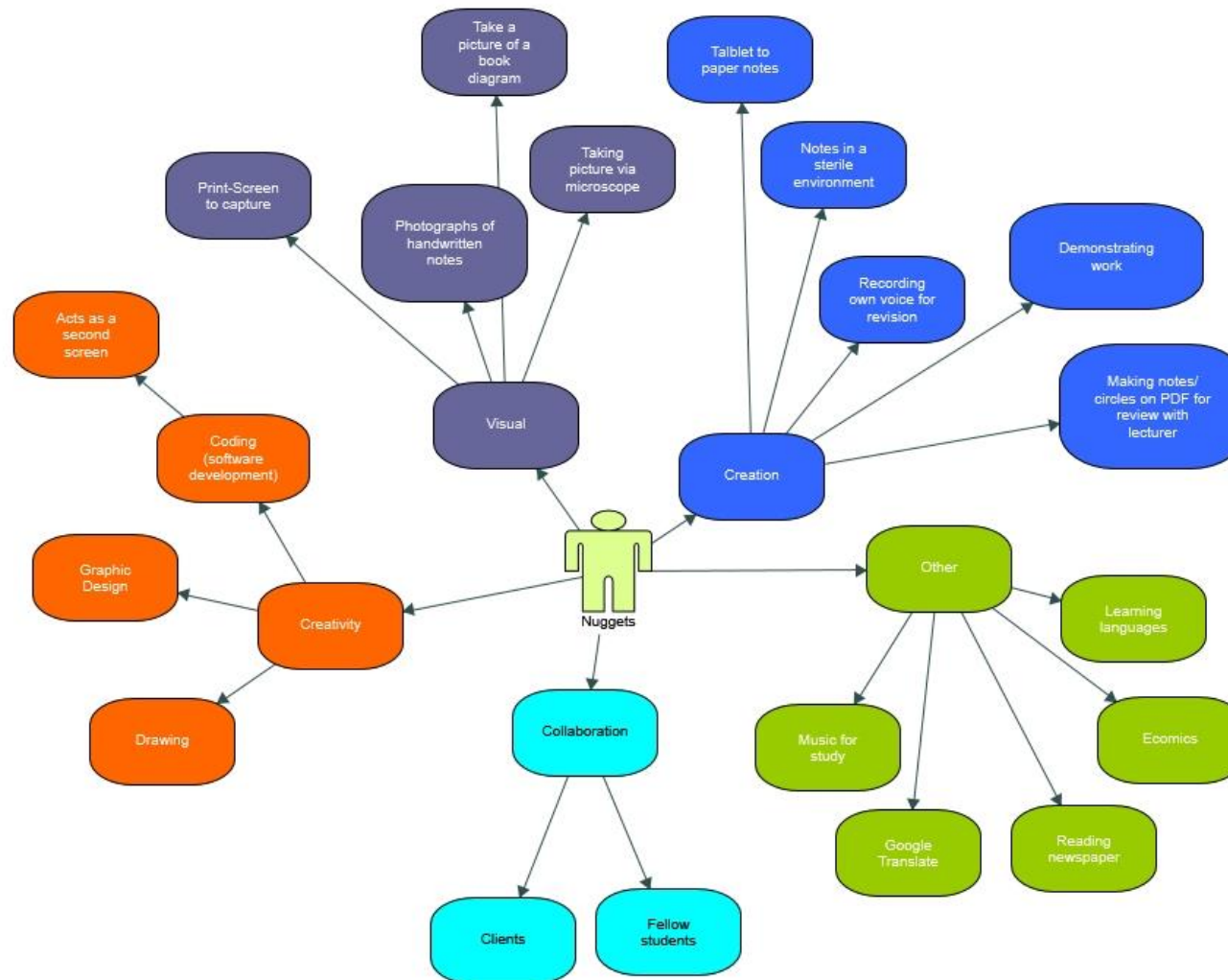
Figure 4.8-1 - Nuggets

It is clear that participants viewed their device as a tool, which is consistent with the literature (Elphick, 2018), putting their device to use in a wide range of activities and contexts, some academic and some non-academic.

4.8.1 Academic use

As would be expected, academic use of the tablet device provides the most numerous examples of usage. What is striking is the number of varied uses to which the devices can be put, with participants displaying instances of ingenuity. Yet, as we will discover some uses owed less to ingenuity and more to the labour-saving potential the devices offer.

Two features of tablet devices were notable for their lack of use by participants – the audio recording feature and the rear-facing camera. Both of these features were mentioned very little during the research, however on the two occasions where they were mentioned, they provided some particularly novel examples of nuggets for academic use.

As would be expected, the research uncovered significantly more examples of nuggets that could be classified as academically orientated. Rodger, a software engineering student, regularly utilised his tablet for both academic- and non-academic use. One nugget that emerged was his use of the tablet device for short, task-orientated programming activities:

> *For me specifically, it's quite handy to have…. I have an IDE [Integrated Development Environment] on it for coding.*

The IDE is a piece of software used in computer programming activities. To have such a large, cumbersome and resource-heavy piece of software on a tablet device, is particularly unusual. In addition, programming requires extensive typing, and Rodger indicated that he did not use a physical keyboard with his tablet device, it was all done using a virtual keyboard:

> *It has, like a custom keyboard…that's built into the software that's designed specifically for coding.*

With the requirement of significant periods of typing and corrections, a tablet device would not be an obvious choice for a computer programmer. Yet Rodger goes to lengths to explain that what programming he does on the device is of short duration, particularly during class when a lecturer is demonstrating on an overhead projector:

> *It's quite limited in what it does. It is no replacement for a full development environment. But for just doing bits and pieces and testing stuff, Which is exactly what I do in class*

Nowhere more is the utility vs. usability debate more apparent than this example. Richard acknowledges that the IDE is a cut-down, limited functionality piece of software, but is acutely aware that despite these limitations, it is particularly usable during class.

Continuing on with the same participant, it is common for computer programmers to work with two screens while engaging in software development. On top of this, there is also a need to refer to documentation on occasion, so Rodger provided an example of using his tablet device as a third screen during the development process:

> *You know we do quite a bit of work in the dual-screen labs, with four windows open on each, this sort of madness. And just to have another one there is very handy [the tablet screen], one that you can skip through quickly.*

Another student finds a novel use for the tablet when watching prescribed education or subject related videos. While watching videos on a tablet device is far from unusual, Beatrice devised a novel use to capture stills from videos to be incorporated into written reports at a later stage:

> *No, you don't even have to pause it, you just print-screen it instantly*

Beatrice went to particular lengths to articulate how much easier it was with the iPad to do the same activity with a laptop:

> *Yeah, even if you printscreen something from the computer, you are still saving it to a Word document, whereas if you actually have it in photos in the iPad, there's a million things you can do with it. You can send it to Instagram, and do all sorts of little things with it to make it look a lovely picture.*

Again, the contrast between utility and usability is apparent, with the iPad being perceived as facilitating such activities related to the programme of study much better than a laptop.

One feature of the tablet devices that appears to be significantly under-utilised is the rear camera. Only two participants reported that they used it and even at that, it was particularly

uncommon. However, a novel use did emerge from one participant that involved hand-written notes. Jennifer was undertaking a trip abroad with a family member. Balancing the need to maintain currency in academic studies, with the need to support the family member, Jennifer reasoned that taking a laptop with here would be somewhat cumbersome:

> *I didn't want to bring the big laptop over, because I only had hand luggage, a schoolbag. Because we were only going for three days and I didn't want to bring the big laptop with me and I didn't want my smartphone either.*

She then proceeded to reason that bringing a significant number of pages of notes on her trip may pose some problems:

> *I had written out all the notes clearly on pages, there was… could have been 50 pages, and they would go missing in and out of bags when travelling. They would have gotten crumpled and stuff*

And ultimately decided on using the iPad to take photographs of the written notes:

> *so I took the photos on the iPad and brought the iPad with me.*

Not only was the iPad ideal for storing the photographs of the notes, but the visible attributes of the notes were preserved also:

> *…I had things highlighted and written in different colours*

it also made the reading of the notes particularly easier:

> *and it made it a lot clearer to just take the photos. But you could zoom in on them as well, to look at the smaller things, so it was handy*

The utility of the iPad, the physical attributes that were convenient for travelling, the storage capacity to store over fifty pages of handwritten notes and the ability to "pinch-and-zoom" to facilitate zooming in on features are all apparent to the participant.

Another report of using the camera is in the use of physical textbooks. Richard comments how he uses the rear-facing camera of his device to take photographs of items in textbooks:

> *if there is something related in the textbooks, I will take a screenshot [photograph] and chuck it in there [to a Word document]*

When asked to elaborate on this particular use, he says:

Diagrams, just diagrams. Or like models of aggression, or stuff like that. So even off [from] journals. Sometimes there are models in there [diagrams]

Interviewer: Yeah, of course. And you take a picture of them?

Richard: Yeah.

A third and final reported use of the rear-facing camera is particularly novel and applicable to a specific context. David is a third-year science student and regularly uses his iPad in the laboratories when undertaking practical work. Discussion commences with him mentioning how he prefers using his iPad to the more traditional method of a paper-based laboratory workbook, suggesting an element of environmental conscientiousness:

And it's more... I'm an environmental scientist, I don't like using paper.

However, it appears he is more driven by the practicalities of taking notes during the laboratory sessions than concerns for the environment. When asked why he uses the iPad, his reply is somewhat nonchalant:

Give a lazy person a job, and they'll find the easiest way to do it.

Yet appears to contradict himself when he suggests that he just wants to be more efficient when undertaking laboratory work:

But it's not even just paper, it's being efficient in the lab itself.

But this response undermines the innovative use of the iPad that David demonstrates during these laboratory sessions. To use the iPad, David suggests that it is more suited to a sterile environment than a paper-based notebook:

It's easy to sterilise [the tablet]. Rather than the copy [paper notebook].

Typically, these sessions involve making observations using a microscope and taking notes. In a particularly unique example of the nugget concept, David places the rear-facing camera of the iPad directly in contact with the eyepiece of the microscope and takes photographs to be incorporate later into a report:

Interviewer: You take photos of what actually?

David: Of the…through the optical lenses of the microscope.

David continues, explaining how he also uses a stylus to record written notes in the laboratory session:

Interviewer: You mentioned data collection, then. What is that?

David: That's what I would use the stylus for. I would bring up a paint document, I can just scribble in.

As he is working through the session, he is taking photographs and making notes on his observation for future incorporation into a laboratory report. The transcription occurs from the iPad document to a report document using a laptop computer:

Interviewer: How would you take them and incorporate that data you have collected, into your report?

David: Oh, I'd just type them in [on a laptop]

And he emails the photographs to himself for incorporation into the written report:

The photographs then get sent on to my email, and then I have to [transfer] the email onto the laptop. I wouldn't do that on the tablet.

Clara presents a particularly novel use of her tablet device while reading newspapers. It is not required reading for the programme of study she is undertaking, however she feels the need to keep informed and make notes of articles that may be of use when writing reports. The technique used is to read a newspaper via a dedicated software application and when she finds an article of interest, she electronically makes a note of this for future use:

I liked to use my device to read newspaper and when I find something interesting…..or like something that I want to note down, I will use SNote [software], I will … I will screenshot the thing I want or use the function and then circle out the points, the article I want, and then I will put it inside SNote. (Clara)

When questioned on her motivation for undertaking such activities, she provides the following context:

…sometimes when teacher asks us to do a presentation, and then some times like an economics presentation, or whatever presentations, sometimes we will link….we will think back "Oh, last time I read this article" then we can find out, we can look back to our SNote, and then find that it is this data. Because newspapers, every day we have newspapers, but if you want to track back, which way the article is, it is very difficult.

(Clara)

The utility of the tablet device in saving interesting articles for later incorporation into presentations is apparent.

Clara also presents another nugget, but one perhaps that could be argued as a particularly low-technology solution to learning. As she is only studying in the institution for one academic year, she resides at a local student accommodation. Study facilities there appear to be less conducive to learning, yet she perseveres:

my hostel the table is sometimes, my revision table is very small.

Again, demonstrating an innovative approach to the situation, she notes how the laptop would be too cumbersome in this particular situation:

And then if I put the laptop here [on the small table] and then I don't have space

However, the tablet is perfectly suited to such a situation:

I don't have the space to write with a computer [laptop], but if [I use the] tablet, it is very small.

While working in this manner, Clara explains how she reviews notes and material on her tablet device and transcribes to paper notes:

Clara: I would read on [from] the slides, and maybe some important points, I will copy from the slides, copy them.

Interviewer: On paper, or on this [tablet]?

Clara: On paper, I will refer to the tablet.

Jennifer relayed an instance of where she used the audio recording features of her iPad to record herself reading out notes, which could be listened to at a later stage.

> *I would have read parts of it out of the book, or parts of the notes that I had to remember. There is one thing we did last year that was PESTEL [analysis] and it was the letters and the meanings of each letter. I'd say 'P' for political, and I'd have read it off, and then I would say 'E' for environmental.*

In this particular instance, she comments on how effective this technique was for her:

> *I still remember them now, the six letters and what they were. I don't remember the meanings, but I remember what they stand for.*

However, this was the only instance reported of participants using the audio recording functionality of their tablet device.

Demonstrating work emerged as a notable use of the tablet devices. Whether this use was demonstrating to fellow students or lecturers while requesting feedback, the physical attributes of the device appear to be a significant factor for this particular nugget.

Christopher was particularly effusive about his use of his iPad Pro, when compared to his previous device. When asked to quantify the difference, he replied:

> *Night and day, of like, what it could do, in terms of productivity*

As a graphic design student, he found the device to be particularly effective in terms of creativity. When soliciting feedback from his lecturers, he comments:

> *I can show it to them if they want. But, if you show them there on the iPad, you don't have to go printing it out, like doing it all again. I can just make changes right there and then. Instead of having to redo things.*

Clara gave another example of where the tablet device was used in preference to a smartphone and a laptop for demonstrating a project she had been working on:

> *We have to introduce our product [project]. It is very, very difficult to show on the phone, because at that time, we did not have the hard copy yet, we just had the soft copy. To show inside a phone, is very small. To show on a laptop, you have to carry the laptop and show to the people. So at the time, I used my tablet to show the people.*

She also offers another example where she was soliciting feedback from a lecturer and notes the convenience of the tablet in this particular situation:

we came up with the assignment [to the lecturer]. It is impossible for you to bring the laptop and show in front of her, or show in the phone. Or maybe it is very wasteful to print out the notes, so you just show in the tablet.

David continues on this theme, while reviewing notes in preparation for a tutorial class, he annotates them with colours and circles as mnemonics to be discussed during the tutorial:

And then I would have it on the iPad, go into the tutorial, bring it up, all the circles are all over the place…

Rodger offered the example when during class he was looking at lines of software code and requested help from the lecturer. He was able to do it there and then and come to a solution using the tablet:

And on the tab, I was able to go "ching, ching ching" and he looked at it immediately [the lecturer], and went "Ah, there's the problem there" and "Oh, try this." And I went pop, compile, and I was like   "brilliant". And he goes "there's an error there." But it's only because it is on this, and not in your project file or folders [on your desktop computer]

The physical characteristics, specifically the portability factor of the device is apparent in these cases.

4.9   Using – Dipping in

The concept of *Dipping In* is the ability of the participants to engage in an activity that is of short duration, usually spontaneous. Typically, such activities would be checking email or social media, but in this context it is actively engaging in an activity, beyond the cursory and shallow, with evidence of agency and clear objectives.

When discussing a particular case of a short burst of learning, Rodger presents the following scenario:

[If] you are sitting waiting for a bus, whip it out [the tablet]. You've got 15 minutes before class starts, jump into it. It's pretty handy in that respect.

He continues with his own view of this functionality:

I suppose the term to use is "pick up, put down", you know?

When asked to differentiate between his use of the laptop and the use of his tab, the delineation is quite apparent:

> *Em, I suppose I would use this for casual usage…This is [the tablet]. Basically, anything I can do quickly. You know, quick Google searching, browsing, reading, file accessing…*

He continues, with clear uses of each device apparent:

> *But any sort of heavy workload stuff, that requires more CPU and more RAM, that's where I need to crank the laptop up.*

The concept of dipping in appears to facilitate activities that have previously been classified as nuggets, yet would not be achievable were it not for the instant on feature of the device.

Drawing comparisons of the use of various different devices, Jennifer notes her preference for her tablet device while sitting on the couch:

> *And if I was to sit in the sitting room in the evenings, and just rather than taking out the laptop, I find the screen on the smartphone quite small, because I've got bad eyesight, so I'd just look up something and put it away, rather than taking out the laptop and turning it on and having it in the way.*

The concept of dipping in suggests activities that are temporal in nature, infrequent, spontaneous and very much ad-hoc. The nature of the tablet device, in particular the instant on feature, facilitates such activities. In line with the thinking that these activities form part of the learning experience, both inside the campus and outside, evidence of engagement in the complex, social aspect of the learning environment is clear. However, there is another aspect of tablet use that is equally evident, that of non-academic use.

4.9.1 Non-academic use

The very nature of being a student straddles the competing demands on-campus, with the academic and social demands off-campus. Being a student does not just end when a student leaves the campus, and that blurring of lines between on-campus and off-campus life is even more pronounced within the context of tablet use. Learning is no longer confined to scheduled times in lecture halls and laboratories, with the advent of learning management systems, ubiquitous connectivity, learners can engage with each other and with learning

material at a time and location of their choosing (Cross, Sharples, Healing, & Ellis, 2019).

But in tandem with the demands of academic life, there must also be time to live. The connectivity and functionality of tablet devices not only lend themselves well to the academic environment, but also offer functionality that encompasses communication and media consumption. One aspect of the present study was to look at the use of tablet devices outside the context of the learning environment to build up a picture of the lived experience. It is to this non-academic use of the tablet devices that I now turn.

Tablet devices, by their design, encompass a range of functionality in a portable device, with a simplified user interface. Coupled with the relatively large screen, the multimedia features present a range of opportunities for using it in a leisure context. A lot of this functionality can have a dual purpose, both academically and non-academically. It is again within this realm that we explore student experience, which, as will be seen, has turned up yet more nuggets.

As the participants in this study are all undergraduate students, the focus of all discussions with them were within the context of the learning environment. What became quickly apparent, though not unexpected, was the range of uses to which the devices were put that did not necessarily have anything to do with learning yet contributed to the lived experience. The first such example we turn to is one of a student who used his device to learn languages for the sake of it.

Participant Rodger reported that he used software on his device to learn German. This was not a requirement for the course and discussion centred around his motivation. When asked why specifically German, he replied:

> Rodger: Em, I dunno, just because … em, I just chose it. That was it. I did French in school and I developed a bitter hatred for it, because of it, because of the way it was taught. Spanish was never a language I considered, and it was German, that's another massively spoken one, go for that.

When questioned as to his motivation, there did not appear to be any real reason:

> I've started about a month ago, so on-and-off, just trying to learn a little bit of German…for the sake of it.

He was then asked if he had aspirations of working in a German country.

Rodger: Maybe, I wouldn't rule it out. But definitely having this in my pocket would be a big help.

In the ensuing discussion with Rodger, a second non-academic use of his tablet device emerged – reading ecomics. These are essentially the traditional comic format, displayed on the screen of the tablet device. He comments on how providers are seeing this as a new and emerging market:

because the people who are doing this, the big hitters, Marvel, DC, all those ones, they've started to look at it in a more, you know, they understand that this is on a tablet.…and that is being viewed in digital format.

Another multimedia-type nugget emerged from the discussion with David. He commented on how, living far away from home, he shared accommodation with a number of international students. He goes to lengths to explain the very multi-cultural environment he is used to living in:

I've lived with international students for two years now…So I've had Spanish, French, Turkish, Malaysian, Slovakian and Czech.

When asked if he uses Google Translate, he responds:

"Google Translate is our best friend."

He cites one example of a dinner where a number of his fellow students sat around the dinner table and attempted to have a discussion, with the aid of Google Translate:

We all planned a dinner, and we had dinner, and everything, but we were trying to discuss stuff, more than just "how was your day" and all that kind of stuff. And it was always, kind of "Oh, what's the word", that kind of stuff.

Interviewer: Right.

David: And it was always back to Google.

Interviewer: So the tab would be there?

David: Yeah, the tab. Because it is easier.

Listening to music through headphones is common with devices such as phones or iPods. But listening to music on a device such as a tablet is would be a less obvious use. However, a number of participants report that they listen to music while engaging in a range of activities, from studying to relaxing.

Christopher notes how he listens to music while cooking:

I use it for, like music if I am cooking.

But a number of participants noted how they listened to music while studying:

Usually, like today, I have nothing on. But sometimes I would be listening to more melodic music. If I am in a mood, I would listen to more Passenger and Ed Sheeran.

(Christopher)

I would go to YouTube and search for "study music" (Clara)

Additionally, Rodger commented how he listens to both music and podcasts related to his studies:

I would listen to a bit of streaming, or I would listen to music.

And the odd time, I might listen to something that is related to tech podcasts, on the fly, some stuff like that.

Using the tablet device to keep in touch with loved ones is also a common occurrence. Beatrice mentions how her husband was sick and that during this time, she used her iPad to communicate with him:

My husband was sick, so…the two of us would Skype.

Clara also uses the tablet to communicate with her family back home in Asia:

Normally, with my family, I would use WeChat.

In addition to communicating with family, friends and prospective employers, participants also reported the extent to which they use their devices for entertainment. In particular, the physical attributes of the devices lend themselves very well to watching videos, something that five out of the eight participants reported.

Christopher watches a range of videos for entertainment. When asked what he watches on his device, he notes:

> *Watch YouTube videos, maybe like movie reviews, movies.*

Similar activities are reported by other participants:

> *I watch Netflix, I watch YouTube. (Christopher)*

> *watching "Pretty good liars" Netflix. (Jennifer)*

It is apparent from the data that the non-academic use of tablet devices plays an important role in being an undergraduate student. However, the blurring of boundaries between academic use and non-academic use is also apparent, a point to which I now turn.

4.10 Being – The Blurring of Boundaries

It would be inconceivable to suggest that the moment a student walks outside the campus that she ceases to be a student. The delineation between academic and non-academic life is even more blurred by the use of the tablet device and the always-on nature of such devices. The instant on and ubiquitous connectivity of tablet devices facilitates a range of activities that support learning, in particular the 21st century concepts of collaboration and creativity (van Laar et al., 2017).
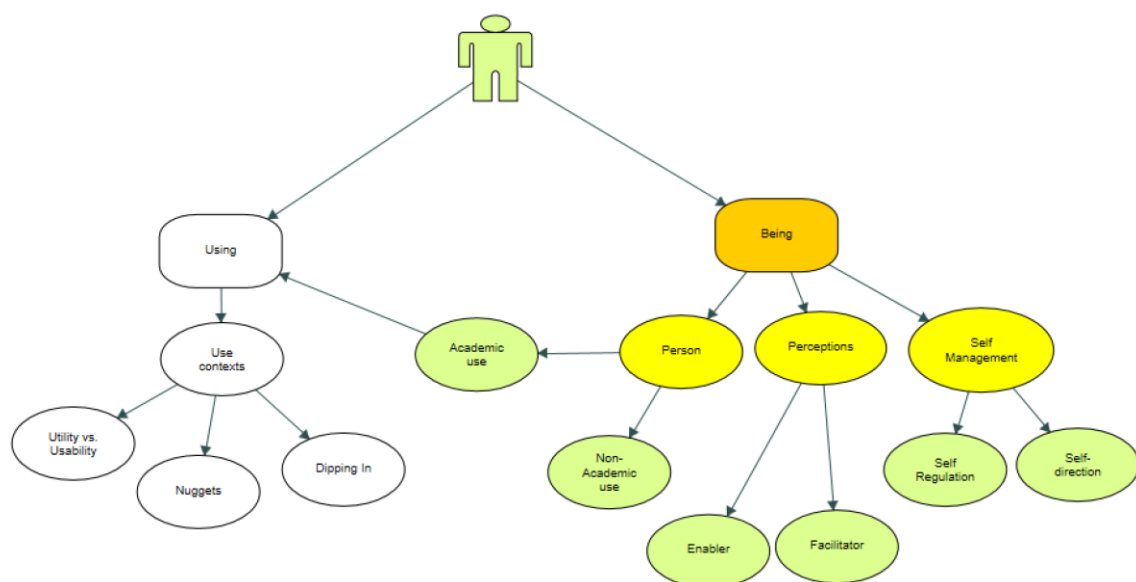
Figure 4.10-1 - Being

4.10.1 Collaboration

That a connected device such as a tablet is used for collaboration is not surprising. Participants reported on more than one occasion about using the collaborative features of their respective devices for collaboration. Taking collaboration to mean the sharing of files and communication about such files, we can see many examples of such activities from participants:

> *I'd have things on Google Drive and I would share. (Beatrice)*

> *If somebody is missing, you just share the file of the sheet. (John)*

> *I can send stuff to people, I can upload files to it, that are relevant. (Rodger)*

What is surprising, and accordingly presented as a nugget, is the example of a student who puts himself through college by engaging in freelance graphic design work. In one example, he mentions a gaming company:

> *I am a big gamer, because I do graphics for a gaming organisation. Like I do work for them. (John)*

with whom he regularly collaborates. John speaks about his extensive work for clients in this area, showing discipline in separating his academic life from his professional life.

> *When I get home, nights, I work graphic design website design anything I can do to make money*

When working with clients, he utilises his tablet device heavily and on occasion communicates and collaborates with them. Giving one example on some work he did:

> *It was website design. He wants to know what I could do. He wanted to see previous examples, and then, because it was Skype I could share my screen. And because the tablet has the drawing capability, I brought up Microsoft paint, and I just drew out a layout, That I could do a general sketch for him. And then he could tell me what he wanted, And how I could change it.*

To him, his tablet device is a tool for creativity. A nugget I now turn to.

4.10.2 Creativity

Evident from the research was a sense of creativity that the device unleashes in some of the

participants. Going beyond the regular collaboration, communicating and entertainment discussed so far, these nuggets shift the emphasis away from the tablet device as an information consumption device to a device utilised for creating new material, specifically in the graphic design space. What is notable about the examples below is the use of a stylus with the tablet device.

When initially talking about his device, John comments on how making presentations is a regular feature of classwork. However, he is clear that he doesn't rely on the regular format of presentation software such as Microsoft Powerpoint, he likes to put his own mark on his presentations by making his own templates:

> *I like to draw my own presentations, I don't like doing the basic open Powerpoint, grab a template… I like to make my own, I like to get creative with it.*

John continues in this vein, explaining how the use of the tablet is not just confined to the academic sphere, commenting on using the device for the external work he engages in:

> *Its website design and graphic design.*

Another participant who utilises his tablet device extensively for creative work is Christopher. A graphic design student, he uses the Apple Pencil with his device and when asked how he felt about the device when he first saw it, he was pretty effusive:

> *Oh, it was like magic!*

> *So when I saw this new iPad, it was "wooooow".*

He appears to be quite clear of the purpose of the device when he purchased it, that it was entirely for graphic design and not much else:

> *I don't even have any games on it. You know how people have games on their tablet? I have none of that. It's purely a graphic design-purposed device.*

Christopher goes to lengths to give an example of a project he is currently working on and is confident that he would not have obtained the same results using more traditional techniques:

> *With the iPad Pro, you can do that. If you used pen and paper, you would create something different. Like, maybe you wouldn't have that in mind.*

As I said before, I wouldn't have gotten to where I was without it. I would have had a different thought process. And the process I get with the iPad, I think it is more beneficial

The two participants, Christopher and John, use their devices for activities such as entertainment in much the same way as other participants. However, what sets them apart from the other participants is the graphic design element, where they both use their devices in a much more creative manner.

4.10.3 Grey Areas[3]

Tablet devices are primarily media consumption devices (Chan-Olmsted & Shay, 2016). Revolutionised by Apple, music distribution has almost completely shifted to the digital domain, with movies and television programmes currently following suit (Apple, 2018). Tablet devices, with their larger screens and multimedia features are ideal for the consumption of such media. In addition, the rise of the ebook, helped in no small part by Amazon (Amazon, n.d.), has also resulted in a significant number of books being made available in electronic format for reading on devices such as tablet devices.

During the course of this research, discussion inevitably turned to media consumption by students, with all students reporting some form of academic and non-academic use of the tablet devices. What was notable, was when discussion veered into the realm of illegal digital content, with half of participants commenting on, and actually admitting to, using illegally obtained media. This covered the full range – music, video and electronic textbooks. What was telling, were the various opinions and attitudes to such illegal content, with one example of a participant who paid for content, seemingly unaware that the content was illegally sourced.

One participant talks about his use of his iPad Pro and the extent to which he uses it for non-academic use. When the discussion turned to watching films on his device, he relays how he sought to obtain such media at a reduced rate in comparison to what would be considered more normal channels:

Researcher: And the likes of Apple Store, you can get movies on that, can't you?

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[3] Given the legal implications of this topic, participant pseudonyms have been removed from this section

Participant: That's very expensive. There are better.

Researcher: So just out of curiosity, what other sites are out there?

Participant: Em, [named illegal site]. It's a subscription-based thing.

So while this participant was willing to pay for media content, it appears he was unaware that the named website was in fact sharing illegal copies of films.

Another participant, however, appears to be more aware of the legal standing of applications she uses. When comparing the restrictions one manufacturer places on their devices compared to others, she notes:

There's an app called [named], it's movies. So you can click into it and look at all the channels worldwide. But you can't get that app on any Apple device. Like phones, or tablets or anything. But you can get it [the app] on everything Android.

Researcher: Totally illegal?

Participant: Oh yeah. It's pretty good, though.

And it is not just media that participants reported using on their respective devices. The cost of paper books was offered as a justification for using illegal copies as another participant noted:

I was handed a USB key by a random person in a hood, let's say…So these are text books, or books that would be very, very expensive, that can be freely shared. Which, I've always defended, especially when it comes to college students, hiding information that is relevant to them, behind a ridiculous paywall, serves no one any purpose whatsoever. So yeah, it's handy having them.

Another participant also reported similar activities, also citing the cost of books as justification. In an exchange with the interviewer, that participant acknowledged the illegal nature of what he does:

Participant: And also, I download some textbooks I needed, and I store them on OneDrive…If that is relevant….

Interviewer: Yeah, of course. Textbooks for the course?

Participant: Yeah.

Interviewer: Would that be a grey area, perhaps? Would they be legal?

Participant: [nervous laughter]

Interviewer: Ok, that's interesting. First question is, why would you do that?

Participant: Because it is too expensive to buy them...If I really need it. I am sorry, it is not ethical, but I need it.

What is striking about the examples given is the three of the four participants acknowledge what they are doing is illegal yet continue to do so. The ethical and moral aspects of such activities do not appear to factor in their decision to avail of such content.

4.11 Being – Perceptions

In line with Venkatesh et al.'s (2012) concept of performance expectation, all participants commented on the effectiveness of their respective tablet devices and generally viewed them in a positive light. The simplistic user interface, with somewhat limited functionality appears to be appealing, in comparison with computers and laptops.

When asked which she would reach for first, Beatrice is emphatic in her response:

I would go for the iPad, it is so much simpler, because I can go and check loads of things on it.

But the perceived simplicity of the device is perhaps exemplified in another comparison with a computer:

if you are doing something, and somebody is around, you can always, you know, have an iPad and sort of be doing something and getting a video that nobody knows about with the sound turned off... You can't do those sort of things with a computer.

(Beatrice)

Beatrice perceives a simple task of muting the sound on her device to be much easier to achieve on a tablet than on a computer.

When asked about her perceptions of her iPad and whether her use during study has changed those perceptions, she continues:

> *Probably, to a certain extent, you know. In my book, anybody, and this is true of all the older people, than can manage to master the iPad, they are away in a hack [doing just fine]. And then you come to college and it is a whole other world, there are things that you have no idea that is even happening. I mean, like editing videos. There is so much stuff that you can do*

Christopher is notably effusive on the benefits of his iPad when engaging in creative work:

> *And in terms of making a portfolio, I find the iPad being the best thing. The best form of…bringing my work together. Through pictures, which I take with the iPad – which is fantastic. A fantastic camera. Through Photoshop, which I have on the iPad, along with Illustrator, the Graphic app, you can just save what you have made, and just bring it into the Notepad Plus*

Suggesting that the ease with which he combines various aspects of his work is facilitated by the iPad.

When asked if he had a preference for watching videos on a tablet or a laptop, David is also particularly effusive with his answer:

> *On the tablet. Definitely the tablet, because it's convenient. For some reason, the wifi works better on a tablet than it does on the laptop, and I don't know why.*

John also perceives the tablet as being particularly useful for use in college:

> *It's just that in college, tablet is much handier.*

While all the participants volunteer examples of where the perceived effectiveness of their tablet device is apparent, this enthusiasm for the devices is tempered with an obvious, and seemingly contradictory, frustration. There is an almost implicit acknowledgement from participants that there are limitations with their devices and that there does not appear to be one true device that will satisfy the demands of an undergraduate student. This is further supported by the fact that all participants reported having three devices – a phone, a tablet and a laptop.

4.11.1.1 Frustrations

Rather than paint an overwhelmingly positive view of tablet devices, a strong sense of evident

frustration with has emerged from the data. While participants can no doubt see the merit in the devices and evidently put them to a wide range of uses in achieving their educational goals, there is an underlying acknowledgement that there is a fundamental trade-off between usability and utility when using tablet devices. The first notable point is the fact that all participants have three devices, phone, tablet and laptop, suggesting that no one devices is the perfect all-rounder and capable of fulfilling all functionality demanded by a student.

Clara, using Google Translate to translate articles to her native Mandarin on her tablet has become a frustrating experience. When asked how she would use Google Translate, she notes:

> *On the laptop. Because I found that Google Translate…if I use tablet… I cannot copy and paste a very long article.*

When asked about specific functionality of her tablet device, the last time she took notes using a stylus, Clara comments how she has given up in frustration:

> *Last time? Previously, but now because the device is become slow, its become slowly, it's like, when we use SNote, it responds slower, so I don't right now.*

Richard also relays his frustrations while attempting to take handwritten notes on his device:

> *I spend all the time writing all the notes, but it's very slow…better typed…Typing is much faster. I can type much faster.*

David suggests his device is slowing down and approaching time to change it:

> *I've even thought about changing it now, mainly because it is kind of glitching and it is kind of…. So it's getting annoying.*

On a more fundamental level, Jennifer suggests the functionality of her iPad is limited due to the lack of specialist software. When asked which she would use more, her laptop or her tablet, she replies:

> *The laptop I use my college work for, because….em, there's a lot of software you can get on the laptop that you can't get on the iPad*

The constant need to update his device proved a source of frustration for John. When asked

to relay a time that his device let him down, he notes:

> *…We were doing a…it was a lab of some sort and I was taking the lab notes on my tablet, because he [the lecturer] wanted a paper handed in after the week…So I took it on my tablet, so I didn't have to waste a bunch of paper…And em, turned the tablet on, about to take notes, a 2 hour class, and Windows Update happened and for the whole two hour class, I was wasting paper [taking notes].*

The actual ergonomics and design of the device are a source of minor irritation for Rodger:

> *One thing that I will say is just specifically on this, one of the things I have had a problem with, because it is quite wide, you hold it like this, and this button here, you can pop it [accidentally activate]. That's the only thing that I could consider an irritation, everything   else is fine.*

Yet the sense of frustration participants experienced with their tablet devices is contrasted with the unique and novel uses to which the devices are put.

4.12 Being – Enabler or Facilitator

The question of whether a tablet device is a facilitator or an enabler of learning in this context will now be explored. To suggest the tablet device is an enabler, it would have to be within the context of being required for learning and consequently, supported by the institution in many ways. It would also suggest that the device is embedded within the learning environment – the lecture halls, the library, the classroom, the laboratory and the computer lab. Evidence emerged of tablet use in each of these contexts in isolation, or in a number of related examples, but there is no coherent, conscious effort to embed tablet devices within these contexts. Lecturing staff, aside from one or two examples, do not appear to encourage the use of tablets, nor does the institution. However, neither does the institution prohibit students from using tablet devices. So the question turns to whether, for the participants of this study, a table devices is an enabler or a facilitator.

4.12.1 Enabler

It would be reasonable to assume that some learning takes place in a lecture hall or classroom. Typically, the asynchronous nature of such an environment involves a graphical slideshow, with students expected to follow this slideshow while making notes of relevant

points. It is within this context we turn to in an effort to explore the enabler vs. facilitator divide of tablets.

One example of the tablet device is enabling learning is the scenario as described by David. During lecturers, he downloads the lecturer's Powerpoint slides to his tablet, so he can follow what is being displayed on the large screen, as he finds the projector screen hard to look at:

> *Interviewer: what you are saying is that you open your material locally on your tab….and as they [the lecturer] are going through it on the screen, you just flick through it.*
>
> *David: …I just scroll through it. Because at least if I did…..whereas if I was looking at the….[hesitation]*
>
> *Interviewer: …the big screen?*
>
> *David: ….yeah, the projector, it's very bright. Which they should change.*

Rodger also uses his tablet device to view material:

> *What I am doing at the moment is, I do 2 things. If it is a very PowerPoint heavy presentation, the lecture is working directly from this, as in stepping through, line by line, or just pick a fight, then what I will do is, I will have the PowerPoint open in front of me.*

He then proceeds to add his own notes to the slides, as the lecturer proceeds through the material:

> *I will just say, make available for editing, and I will just add in a text box, With highlighter text, add my own little bit and pieces on top, and then save it. And then I've got my own personalized version of the lectures notes.*

John takes a different approach. While he does not follow lecturer slides during lectures, he does use the slides outside of class to make his own notes on his tablet device, using the stylus:

And I can click through it, as if it were an actual lecture. Because I've got a pen, I can write the actual notes on the screen. As I am going through the presentation myself, I might save some for after. I might screen shot them whenever I write on them.

When asked if he thinks that this approach helps with his learning, he replies in the affirmative:

Interviewer: And do you think that helps with your learning?

John: Mmmm [affirmative]

Continuing with classes and lectures, a number of participants reported that they use their tablet devices for taking notes during lectures. Clara describes a situation where on one particular occasion she forgot to print paper version of the Powerpoint slides, so just used her tablet to view them electronically. While doing this, she made some electronic notes on the slides:

"So you have to jot down what she added inside the ppt [Powerpoint] file. So at the time, I just downloaded it and just used my SPen...to jot down whatever she said.

Richard notes how he prefers to keep everything electronic:

It saves me a lot of paper. And instead of printing out all the time, it is very annoying. And it is very heavy. When I go to college, I just bring this tablet

And adds that because of his tablet, he has a comprehensive set of notes:

Interviewer: So as she [the lecturer] was talking, for example….

Richard: I just type…To be honest, because I have the tablet, I have complete notes. Without the tablet, I would not have complete notes.

While it is notable that all of the activities described above by the participants can be achieved on a laptop, it is the other, distinctive features of a tablet device that appear to determine why the tablet is used in contrast to a laptop.

4.12.2 Facilitator

The facilitation of learning appears to be achieved in many ways using the tablet device. Taking the social-constructivist view of learning as a complex web of social interaction

through which new knowledge is created, the tablet device appears to lend itself quite well to this context.

The actual device is given functionality by the software, with Facebook being reported as being one of the most heavily used. Significant evidence emerged of participants using this platform to share content and collaborate.

Beatrice commented on how she works with team members on a group project using Facebook:

> *…I was doing one part… And there were three other people doing three parts. And we all did our parts, they were added together and sent to Facebook.*

Richard notes in particular that his group uses Facebook Messenger:

> *Interviewer: And if you were working with a group of students, how would you communicate with a group of students?*
>
> *Richard: A Facebook page, sorry, Facebook Messenger group*

As does Rodger:

> *Any of the projects I have, we have a Facebook Messenger group. So most people will at least have their smartphone in their pocket. So it's free, if you have WiFi, you can send messages or anything like that. I can send stuff to people, I can upload files to it, that are relevant.*

Clara, however, prefers to us Moodle with her fellow students:

> *because if you like, when you face some problem, and then you can straight communicate with your friends with tablet, and then, you can, uh, sometimes with Moodle….*

In what would possibly count as a unique use of the platform, David, recounts using Snapchat for collaboration with a classmate prior to an exam:

> *Can you think of a time in the last while, maybe in the last few days you would have used Snapchat for, kinda, class related stuff?*
>
> *David: Eh, Monday morning.*

In this instance, last-minute revision for an assessment was facilitated by the software:

> *pulled those out [three previous exam papers], highlighted with my colours, all of the various questions, the numbers, the letters, which ever it may be. Did up the questions, sent it off to one of the lads, I know they were awake. And we just did maths over Snapchat.*

The sharing of files and material is another evident use for tablets, in particular storage software such as OneDrive. John shares details about a recent project he and a classmate worked on:

> *Interviewer: Tell me about an occasion where you would have used OneDrive.*
>
> *John: A group project this year.*
>
> *Interviewer: A group project? What was the project?*
>
> *John: We were doing a home automation system.*

He notes how storing work on the OneDrive software facilitates not only sharing with fellow team members, but also his lecturer:

> *Yeah, so we are constantly uploading what we have done weekly or bi-weekly, to keep it up. Just to show the lecturer, look this is what we did this couple of weeks.*

In addition to sharing files and communicating, a number of participants recalled situations where they used their tablet to demonstrate work to either fellow students or to lecturers.

Christopher, who does a lot of graphic design work, notes how he can show work to others and make changes to it immediately:

> *and I can show it to them if they want. But, if you show them there on the iPad, you don't have to go printing it out, like doing it all again. I can just make changes right there and then.*

Rodger gave an example of programming code he was having trouble with, and asked a lecturer for assistance, noting how it was easier on the tablet:

> *…on the tab, I was able to go "ching, ching ching" and he [lecturer] looked at it immediately, and went "Ah, there's the problem there" and "Oh, try this." And I went*

pop, compile, and I was like "brilliant". And he goes "there's an error there." But it's only because it is on this [the tablet], and not in your project file or folder [on the computer]

David relays his experiences with tutorials, where students typically come prepared with questions for lecturers. He annotates files, transfers them to his iPad and presents these at the tutorials:

There's a kind of draw filter, I don't know what it is called, but Ii would do that in the library, on the laptop or PC, I would draw circles, this kind of random stuff. And I would switch it over onto the iPad…And then I would have it on the iPad, go into the tutorial, bring it up

The use of the tablet appears to adhere to the social-constructive view of students collaboratively working. But again, this is the kind of work that could be achieved on other devices such as a laptop. The unique characteristics of the tablet, however, appear to facilitate a particular type of activity that appears more appealing to the participants.

4.13 Being – Self Management

The concepts of self-regulated learning (SRL) and self-directed learning (SDL) were emergent themes among the responses received from the participants. Zimmerman (1986) defines a self-regulated learner as persons who "plan, organise, self-instruct, self-monitor and self-evaluate at various stages during the learning process." Learners who engage in self-regulation are typically higher achievers academically and tend to have a more positive outlook on their future prospects (Zimmerman, 2002). Attributes of self-directed learners include those that engage in learning outside of formal situations and do so for the interest of the subject and the achievement of broader academic goals rather than under instruction from an academic (Lai, Khaddage, & Knezek, 2013). While participants did not demonstrate any awareness of either concepts, a number of examples emerge from the data that suggest participants demonstrate attributes of both SRL and SDL. It cannot be emphatically stated that participants are self-regulated or self-directed learners, however elements of self-direction and self-regulation were apparent.

4.13.1 Planning and organising

The importance of having the ability to take quick notes and set reminders was evident, with participants using such features of their devices to organise themselves. Jennifer mentions a piece of software used to make a to-do list:

> *you have the little app that you can write notes on, a notepad...I can't remember what exactly I was doing, but there was a list of things I had to do when I went home.*
>
> *Researcher: So a list of to-do items?*
>
> *Jennifer: Yeah.*

Rodger has replaced his paper notebook with his tablet, using it extensively to organise himself, but also to capture ideas:

> *Eh, yeah. To-do stuff, pretty much everything. Things I have to do, I don't really use it for reminders anymore, since I started integrating Google Calendar. But, em, stuff like... this is what I have to do, this is what I have done. Or if I have a solidly good idea, you know, which is very rare these days. But, eh, if I get something like that, I'd have whole lists of different categories of types of ideas that I have, I'd just write them all down.*

Clara uses her tablet in a similar manner also to make a list and check progress against her list:

> *Sometimes, I have a lot of due dates, a lot of things I have to do in one day. So sometimes, I would list out what I would do, in this...in today, in the SNote.*

John comments on how he segments his learning in preparation for exams:

> *And when it comes to exam time, I try and say, there are this many I do, each day I have, I've got a note. A page for each day. If you could call it a page...I will then just count how many pages there are, I will say in a week I will do this many pages. I would leave last day, compile the notes and go back over them.*

4.13.2 Self-instruction

Self-instruction was evident with the accessibility of the tablet device and connectivity providing opportunities that participants reported consisted mainly of reading journal articles and ebooks.

Richard supports himself by working part-time. He comments how he takes the bus to work and does some reading on the bus. However, because there is no internet connectivity on the bus, he has to download journal articles on his device, which he brings with him on the bus:

> *I do get time to read [on the bus], I read a lot of stuff…and I'd highlight and I'd take notes.*
>
> *Researcher: Would you need a network connection, or would you have it on…*
>
> *Richard: I don't, because I download it [onto device, prior to taking bus journey]*

Continuing the theme of reading, Beatrice comments on how the lecturer provides ebooks for students, which she finds easier to read on her iPad:

> *In [lecturer's class] there's an ebook and it's much handier on the iPad to be looking at an ebook than it is on the computer.*

David, a science student had a project that involved learning how to code. He notes how the class was provided with resources, including an ebook to learn about the subject matter:

> *I've read a few books on the iPad.*
>
> *Researcher: Give me an example of a book.*
>
> *David: We had to learn coding last year…I was researching from the book on how to do the code.*

4.13.3 Self-monitoring

Two participants explicitly comment on their activities on self-monitoring. These activities appear to be confined to checking their progress using the tablet device.

Jennifer uses notes to measure her progress:

Because I could have 6 questions from Financial Accounting and 10 from Tax, and whatever from anything else, and as I am going along, I can make the list smaller. It makes it easier to see what I have to do. But then you have the questions in a kind of little book format, and you tick them off at the top when you have done them. So when you are flicking through, you can see that one is not ticked, you haven't done the question. It does work.

Clara also maintains checks on her progress:

We open this....so I will write down, and at the end of the day, I will tick it.

4.13.4 Self-direction

Elements of self-direction were evident from a number of participants.

Clara reads extra material that is not prescribed reading for her course:

It's my own...it's not about the school academic book, it's I like the book and I buy the book.

She also makes notes of interesting and related articles that she feels may be of use in future writing:

… because last time I liked to use my device to read newspaper and when I find something interesting…or like something that I want to note down, I will use SNote, I will … I will screenshot the thing I want or use the function and then circle out the points, the article I want, and then I will put it inside SNote.

[when the lecturer] asks us to do a presentation, and then some times like an economics presentation, or whatever presentations, sometimes we will link….we will think back "Oh, last time I read this article" then we can find out, we can look back to our SNote

Rodger suggests he is engaged in an element of self-directed learning, with lecturers giving students in his class freedom to discover relevant and appropriate software for use in a project:

Because a lot of our stuff is self-directed learning. Recently, we had an animation project, for example. And one of the things we were emphasised to use were third-party software…And you are freely open to use whatever you want.

One of the more significant questions arising from this research is the link between SRL/SDL and tablet devices and whether the participants would display these attributes if they did not utilise a tablet device. Furthermore, the question remains unanswered as to whether the purchasing of devices promotes such activities and facilitates the development of SRL/SDL activities in undergraduate students.

4.13.5 Restructuring the physical and social context to achieve goals

Zimmerman (2002) notes that one of the key attributes of a self-regulated learner is the "restructuring of the physical and social context" when attempting to achieve previously set goals. This usually entails finding a quiet place to study uninterrupted, typically one that a learner can return to again and again. Sundgren (2017) suggests that personal technologies can blur the time and location boundaries in higher education, comparable to Martin and Ertzberger's "here and now learning" (Martin & Ertzberger, 2013). The use of headphones is mentioned by five out of the eight participants and use appears to be a type of modern "do not disturb" sign signalling that they are engaged in learning and would rather be left alone. While they do attempt to find a quiet place, they appear to be just as willing to engage in *Dipping in* to snippets of learning in a busy place such as the cafeteria, but clearly signalling that they are busy by wearing the headphones:

If none of the rooms are free, I go into the café and put my headphones on. And then people know that I am busy. (John)

Yeah, I tend to be the kind of person that if I am sitting down to do something … it depends. If I am sitting down to do anything kind of work related or studying, or just something I need to focus on, that's very much I do not want to be disturbed. And putting earphones in is a great way of doing that because especially if I am just sitting in the canteen, I do not deal well with background noise. (Rodger)

However, one participant suggests that that the headphones are more of an aid to learning than a signal of intent. Clara notes how she actually needs noise to study and that the quietness of the library does not help her:

Because sometimes, it is too quiet in the library, so I cannot study. (Clara)

She reveals a little nugget of information on her study technique, stating how she needs music to study:

[I like to]listen to the music while studying.

Researcher: So the music is to quieten out everything else, so you can focus on study?

Clara: yes.

Researcher: ...and is there a particular music that you would choose?

Clara: I would go to YouTube and search for "study music"

Researcher: Oh, there's actually "study music"?

Yeah, for studying music. It [helps] you concentrate on your study.

While the present research did not seek to investigate aspects of SRL and SDL, the evidence presented does not make any claims that participants can be comprehensively described as self-regulated and self-directed learners. However, participants displayed some attributes of SRL and SDL that appear to be tied to the tablet devices.

4.14 Summary

The range of uses to which a tablet device can be put is evident from the results presented. The emergent themes of physical characteristics, utility and connectedness help build up a picture of resourceful undergraduate students putting technology to use in a way that suits their own learning styles and situations. But to neglect the off-campus use of their device would omit a significant component of the learning experience. As is evident, use of the tablet device outside of formal learning environments appears to play as big a part in the participants' lived experience as use on-campus. As the boundaries between academic use and non-academic use blur, I now turn to what it means to be an undergraduate student using a tablet device.

5 Discussion

5.1 Introduction

This study aimed to investigate what it means to be a student at a higher education institution for whom tablet devices play a not inconsequential role in their learning. Using such a device outside a formal initiative by an institution opens up questions as to the goals and motivation of students, in addition to student perceptions of the benefits of such devices. While there never has been a clear delineation between student life on campus versus off campus, the ubiquitous nature of mobile connected devices blurs that delineation even more (Davis & Jurgenson, 2014). No longer is learning confined to within the campus, technology now facilitates the concept of here and now learning (Sundgren, 2017), suggesting learning does not stop once the device is put down, that it occurs informally, within the social networks students have built up (Niu, 2019). The question also arises as to when do students switch between using their tablet device in an educational context and using the device for entertainment or social purposes. In this era of ubiquitous network connectivity, there is never a time when students are not connected. I will explore whether there is a duality of existence as a student and a person, or a dichotomy of being a student and being a person, framed within the context of the role the tablet device plays, particularly in relation to social media.

The findings of this research are almost as diverse as the participants and the range of uses to which they put the tablet devices. However, there are a number of core findings that appear common among the majority of participants. While the participants could not be described as a homogenous group, they could be described as somewhat representative of the broader student body in any higher education institution, with a mixture of ethnicities from Ireland, the EU and Asia. There are a number of categories of tablet use that would be broadly expected when in use at higher education. Such uses include using apps to enhance the student learning experience on a module within a programme (Van Der Ventel et al., 2016), collaboration and sharing of information (Wakefield, Frawley, Tyler, & Dyson, 2018) and for general use in the learning of theory (Stamm et al., 2019). Each of these categories of use are evident in this study, however there are a number of distinct activities that emerge from the findings that do not appear in the literature. These rhetorical gems (van Manen, 2014) are referred to as "nuggets" and much like their mineral counterparts have been

uncovered and refined to contribute to building up the picture of what it means to be an undergraduate student using a tablet device. The usage of tablet devices that emerge from this study can be roughly divided between use that would be expected (using apps, browsing the internet, watching videos, communication) and those that would not be expected (taking pictures down the eye-piece of a microscope, reading ecomics, learning a second language for the sake of it). But while the utility of the device is evident, there is also an underlying frustration with the technology. Tablet devices, by their very nature, present a trade-off between utility and usability, which was particularly evident in the findings. Yet the participants saw advantage in the utility, they were able to utilise the tablet devices as tools to further their educational goals. Accepting the limitations of the functionality, participants used the devices in many diverse, and sometimes unique, ways. The variety of uses to which the tablet devices were put is testament to the initiative and innovativeness of the participants, in particular with an ability to see in these devices a potential that was arguably invisible to manufacturers. I now discuss how tablet devices are used and the part they play in the lived experience of the undergraduate student.

5.2   The Lived Experience of Undergraduate Students using Tablet Devices

As I have discussed in section 2.3, the capabilities of a tablet device are broadly similar to that of a smartphone or a laptop, with the physical attributes being a key differentiator between the three. All participants reported using all three devices, therefore an opportunity presented itself to investigate the use of the tablet and how it differs from the use of the other devices. It became apparent that the device had a unique and defined place in the Lifeworld of the student, but a place that was blurred by differing uses. It is to this place that I now turn.

5.2.1   The Goldilocks Gadget

As suggested by Miles, Huberman, & Saldana (2014), I now utilise the concept of a metaphorical device to explain some of the findings of this study. The fact that participants believed they needed to have three devices are suggests that there is an inherent deficiency with each, that no one device can satisfy all the needs of an undergraduate student. An alternative viewpoint might be that each device has a specific use in a given context. So, then we must ask why the need for the tablet device? What features permeate the various forms of tablets that five out of the eight participants say they could not manage life as a student

without one? It is with this concept in mind that I introduce The Goldilocks Gadget. Figure 5.2-1 below summarises the features that emerged from the data that appeared to be key to participant use of their devices.
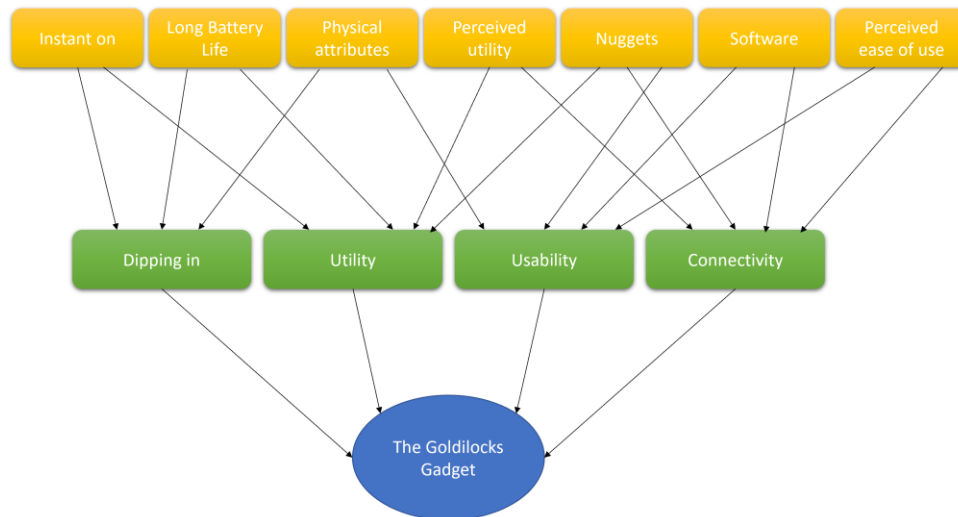
Figure 5.2-1 - The Goldilocks Gadget

Taking a lead from the famous fable of Goldilocks where various elements of the bears' house was either one extreme or another before finding one in the middle that was "just right", it provides an ideal metaphor for participants' views on their tablet device. It would be apparent that a mobile smartphone would fall into the "too small" category for any substantive academic work (Ting, 2012) , whether that is in a lecture theatre, a laboratory or travelling home on the bus. Perhaps best suited to quick viewing of small snippets of information, there is ample evidence in the literature of attempts to incorporate smartphone devices into the learning context (Pimmer et al., 2016). Gikas and Grant (2013) suggest that using smartphones in conjunction with fast internet connectivity and social media provided some opportunities for learning and collaboration. But Martin et. al suggest the engagement opportunities and convenience of situated learning offered by smartphones has to be tempered with the intrusion of continued distractions (Martin & Ertzberger, 2013).

Laptops, a much more common sight in lecture theatres (Castillo-Manzano, Castro-Nuño, López-Valpuesta, Sanz-Díaz, & Yñiguez, 2017; Ragan, Jennings, Massey, & Doolittle, 2014) and while portable, offer the full range of computing resources to a user. Though a significant body of research questions the efficacy of laptops in the lecture theatre, asking whether

taking notes using the keyboard is actually more effective than taking notes with a pen and paper (Mueller & Oppenheimer, 2014), in addition, there is also the question of distractions from laptops. Can a user of a laptop in a lecture theatre stay focussed on the topic at hand and gain maximum benefit from the lecture? Other research has found that laptops are not only a distraction to the user, but also to other students in the vicinity (Sana et al., 2013). It has even been suggested that humans are predisposed to distractions with personal technology devices and that there is very little that can be done about it (Aagaard, 2015b). What is not clear is whether what applies to laptops in the lecture theatre can apply to tablets in a similar environment.

The Goldilocks Gadget is the embodiment of how participants appear to perceive the device and use it in the attainment of educational goals. There are many examples of the physical attributes of the device facilitating the incorporation of the device into the learning environment, the connectivity features that enable instantaneous collaboration and communication and the fact that the screen is an effective trade-off between being not too small, as with a smartphone , and not too big, as with a laptop. As all participants reported having all three devices, there appears to be a delineation between tasks for each device, yet each device offers comparable functionality, the key difference being usability and the context within which that use is situated. Smartphones are the devices for use on the move and used primarily for communication. Laptops are for the "heavy lifting" – the extended writing of reports and presentations. Tablets, however, find a particular position for everything else and appear to offer an acceptable balance and trade-off between portability and functionality.

An illustration of the types of use of the various devices is shown in Figure 5.2-2
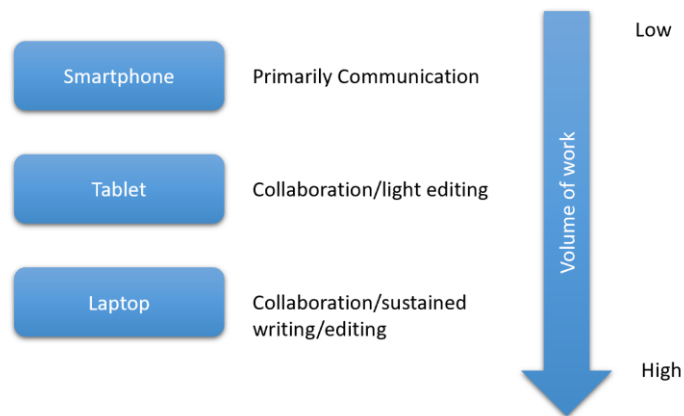
Figure 5.2-2 - Types of use of the various devices

5.2.2 Being a student and using as a student

The perceived use of a tablet device is cited as a reason for purchasing such devices (Chan-Olmsted & Shay, 2016). Participants perceptions on the device range from the perceived ease of use (Beatrice), the ability to create something on a tablet that was different from what could be created on paper (Christopher) or because the device appears to work better than a laptop (David). These perceptions are framed within the educational context, but it is evident that use of the tablet does not stop there. How much enjoyment, or hedonic motivation, that can be derived from a piece of technology plays a significant role in the acceptance and use of such technology (Venkatesh, 2012). It is not unreasonable to assume that participants in this study held beliefs on perceptions of the usefulness of their device from not only an academic perspective, but also from a non-academic perspective. Therefore, within the context of this study, the use within an academic environment is just as relevant as use *outside* of the academic environment.

As has been suggested in the literature (e.g. see Dennen & Burner, 2017), the boundaries between personal use and academic use in this study tend to be quite porous. Rather than one or more distinct set of uses and context appearing, the results suggest that there is a duality at play with the participant as a person and the participant as a student.

5.2.3 Being a person and using as a person

Venkatesh et al's (2012) concept of hedonic motivation of participants was evident, with clear evidence emerging of non-academic use of their tablet device. These uses ranged from

watching movies, to playing games, to reading ecomics, to cooking while listening to music, the use of the tablet device for entertainment was evident.

The use of a tablet, therefore, does not fall into distinct, clearly defined categories. Conceptually, the use of a tablet by undergraduate students falls onto a continuum, with ill-defined boundaries between academic use and non-academic use. Similarly, there is no clear delineation between the participant being a person and being a student. At no point does the participant cease being one and commence being another. Again, the range of uses could be represented on a continuum, with no clear delineation between the person and the student. To demonstrate these concepts, I present Figure 5.2-3 below.

Figure 5.2-3 - Being, Using, Personal and Academic use of a tablet

If the various uses of a tablet device were to be plotted along the continuum, the proximity to, or distance from, each of the extremes, would represent the relative extent to which an activity could be categorised. For example, activities to the left of the continuum would be considered more non-academic use, activities plotted to the right would be categorised as academic use. But as it is a continuum, there is no clear delineation where the activity is neatly categorised as an academic activity only. If we consider the act of reading a Facebook message, which all participants reported doing, it raises the question as to whether that act be considered purely academic, or purely non-academic. It depends on the context, and to a larger extent, the contents of the message.

But while Figure 5.2-3 above represents the uses and the context within which these uses may occur, there is one overarching use of the tablet device that is omitted – that of connectivity. In this era of mass networking, social media acts as a conduit not only for

interaction and communication, but also identity definition (Davis & Jurgenson, 2014). The use of social media was evident by participants of this research and appears to be a key factor in the use of tablet devices. However, use is not just limited to such applications, evidence emerges as to communication and collaboration opportunities on an individual basis.

A model is now presented of what it means to be an undergraduate student in a higher education institution using a tablet device.
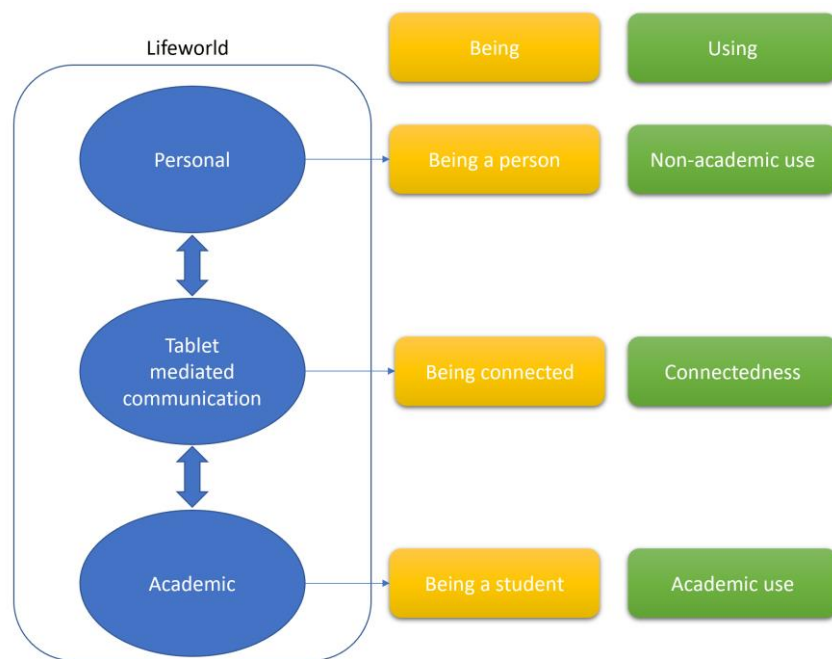
Figure 5.2-4 - The Student Lifeworld

The model presented in Figure 5.2-4 above represents what it means to be an undergraduate student at a HEI using a tablet device. Moran (2012) suggests that rather than one overarching Lifeworld, there are in fact many interleaving Lifeworlds. It is within this context that I present the above concept of the overall Lifeworld, with three interlinking components – the Personal, Tablet Mediated Communication and the Academic.

The *Personal* represents the participant as a person, conceivably unconnected in any way to an academic institution. Being this person is exemplified by the use of the tablet device, which is non-academic in nature. Such uses are the everyday uses that would be expected – viewing movies, listening to music, watching YouTube videos, viewing web pages and reading of books, articles and comics. When viewed through the prism of the consumer adoption and use of information model (Venkatesh, 2012), there is evidence to suggest that participants

are exhibiting the characteristics of hedonic motivation, with the device being used for entertainment purposes.

The *Academic* represents the participant as a student, while still a person, their use of the tablet device in this context is entirely focussed on the academic and the learning environment. I suggest that this concept of the participant as an academic (student) is purposely not situated in a location, such as the campus, but is a broader concept of a student engaging in activities to further the learning, irrespective of time or location. Such activities include collaboration and communication with fellow students, the organisation of work and Henderson, Selwyn, & Aston's (2017) concept of keeping up to date with course announcements from academic staff and administrators.

The third, and interconnecting component of the model is represented by the tablet device itself – *Tablet Mediated Communication*. There does not appear to be a clear delineation between the academic and the person, participants may at once be listening to music while checking the institutional learning management system just as they may be in class while checking Facebook. This blurring of boundaries is facilitated by the tablet device and the almost ubiquitous access to wireless connectivity, meaning that participants are continually connected in both extremes of their Lifeworld. This sense of connectedness permeates every aspect of the participants' lives, with the tablet typically being used when stationary (e.g. on-campus or at home) and the smartphone being used while mobile. In that sense, both devices appear complimentary, with, in this instance, relatively clear delineation between the uses of each. This sense of connectedness manifests itself in a number of ways. The use of social media tools to communicate is evident, on a personal, academic and social level. In addition collaboration appears to be a significant use of the tablet devices, blurring the boundaries of home and campus life.

But to suggest that this sense of connectedness could only be achieved with tablet devices would be unwise. Other personal technologies such as laptops and smartphones have comparable functionality and therefore could be used profitably in such a context. However, I argue that it is the unique characteristics of the tablet device that facilitate this concept of connectedness to a greater extent than is possible with the other personal technologies. It is this facilitation that manifests itself as the Goldilocks Gadget, offering a balance of features and functionality that are appealing to the modern student and generate positive perceptions

as to the impact these devices have not only on the learning environment, but the participant's own learning.

5.3   The Personal

The delineation between participant academic life and personal life is notably blurred. But even the very definition of personal life and academic life are open to interpretation – when does the person stop being a person and become a student? The evidence suggests that while there is no clear delineation, there are distinct activities that are mostly unrelated to academic life that participants engage in. The larger screen size of tablet devices offers a range of multimedia features that appear to be heavily utilised by participants, in particular for entertainment purposes.

5.3.1   Entertainment

A number of participants reported using their device for entertainment purposes. The switching of roles from being a student to being a person could be characterised by the use of the device for such purposes. Video streaming sites are popular:

> *I have Netflix already downloaded, and I just watch that (Jennifer)*

> *Watch YouTube videos, maybe like movie reviews, movies. (Christopher)*

Ranging from music during cooking, to viewing movie reviews and paid-for video content, it would appear that the multimedia features of the device present an opportunity to consider such activities as the delineation between academic and personal life. Music videos, movie reviews and product reviews appear to be the type of content viewed, with a number of participants reporting that they occasionally viewed content through means of questionable legality. Attitudes towards illegal content, or the viewing of it, were surprisingly lax, perhaps raising broader questions as to the availability and cost of paid content. Half of the participants reported using some form of illegal content on their devices. The nonchalance displayed towards illegal media content perhaps mirrors the attitude towards illegal copies of academic textbooks that other participants reported in section 4.10.3.

5.3.2 Reading

Evidence emerging from participants suggest that they perceive the physical attributes of the tablet device are conducive to reading texts from various sources and in locations of their own choice.

A number of participants reported reading books for both pleasure and for academic purposes, in addition to other paid content such as magazines:

> *They have many magazines and you can choose and then you buy it and then every two weeks or every month, the magazine is sending to the apps (Carla)*

One participant, Rodger, used his device for reading electronic comics, commenting how factors such as the large screen, high-quality display and relatively large storage capacity allowed him to view and store a large number of such documents:

> *I have gotten into the ecomic market, which is ebooks, but in the visual format. And my 10.5 inch [tab] is almost perfect size for it (Rodger)*

He appears to exemplify the concept of dipping in, with opportunistic use of his device apparent.

While participants reported that they engaged in reading for pleasure, no strong evidence emerged as to extensive reading by any participants, with reading generally being characterised instead by occasional, opportunistic and relatively brief. Whether this is a reflection of general reading proclivities of undergraduate students, or perhaps a reflection on the unsuitability of a tablet device for extended reading is not clear.

5.3.3 Communication

It might be questioned as to why a participant would use their tablet device while the smartphone provides identical functionality. It was notable that the use of the tablet for such purposes was primarily as a result of physical size of the screen. The use of video conferencing software to communicate with friends and family is evident. Some participants reported having a preference for the iPad over a laptop or smartphone, again suggesting the prevalence of the Goldilocks features – neither too big nor too small, instant accessibility and smooth user interface facilitating a seamless experience. One participant even suggested the wireless networking was particularly better than on other devices:

> *For some reason, the wifi works better on a tablet than it does on the laptop, and I don't know why (David)*

Whether the screen, wireless connectivity or ease of use is objectively better than on a laptop or a smartphone is perhaps for future research, but there appears to be one aspect of tablet use that appears to be inherently positive – participant perceptions of their devices.

5.3.4 Perceptions

Performance expectancy is a key indicator to the success of use of a technology in an academic environment (Fagan, 2019). In line with Venkatesh's (2012) model of consumer adoption of technology, participants appear to exhibit a significant sense of performance expectancy of their tablet devices. Subjective measures of favour towards their tablet devices suggests a strong perception of the utility and usability of their devices. At a fundamental level, the three devices all participants own (smartphone, tablet and laptop) all offer broadly similar functionality. Yet participants appear to view their tablet devices in a more favourable light than their other devices, with comments varying from ease of use to quality of screen.

Academic staff appear to have a different perception of tablets in comparison to laptops in the lecture theatre. Rodger comments that:

> *lecturers have a policy against having a laptop open, but they seem not to be as enforcing when it comes to tablets (Rodger)*

Why this is so is not clear, but offers some insight into differing perceptions among different groups to tablet devices, especially in light of the fact that some research suggests even when such devices are left flat on the table, they still appear to have a detrimental impact on terminal assessment results (Carter et al., 2017).

A further factor in the UTUAT2 model is that of social influence (Venkatesh, 2012). Participant's perceptions of what their peers and family members think of them and their devices also appear to be an important concept in the adoption of tablet devices. The novelty factor of tablet devices is a recurrent theme in the literature (e.g. see Butcher, 2016; Chou, Chang, & Lin, 2017; Nguyen, Barton, & Nguyen, 2015) with participants commenting on how them using the device in the classroom or lecture theatre was perceived by their fellow students. In some cases, it was positive:

When you take out the tablet, it is "Wow!" (Carla)

and in other cases it was a natural curiosity:

I still have people looking over my shoulder as I write (John)

The fact that laptop use in a lecture theatre does not draw attention from peers, yet tablet use does, suggests that tablets are not yet as common in lecture theatres as laptops, a point in common with some research (Elphick, 2018).

5.3.5   Being a person

It appears the tablet device, when used in a personal context, offers a range of features that participants appear to find unique and preferable when compared with other personal technologies such as laptops or smartphones. Attributes such as the "pick-upness" articulated by Rodger give an insight into how the devices are perceived. As I have mentioned in section 4.5.1.1, the devices appear to offer the right balance between size:

seven inch and it was too small…And ten inch, I wouldn't want to carry around (John)

and features that are appealing to participants:

I want everything electronic (Richard)

However, in this context, motivation for purchasing such devices appear to be more for academic use. But that is not to say that the devices are not used for non-academic purposes. Clearly emerging from the participants are a wide range of uses, not all related to academic studies. It is clear that the device plays a dual role in their lives, with participants switching between academic and personal with relative frequency and ease. It is apparent that the tablet device offers a range of attractive features, in a physical size that is appealing and functionality that is useful in a range of contexts.

5.4   The Academic

As I have discussed in section 4.10, the delineation between being a person and being a student is particularly blurred, mediated by the tablet device. Aside from wireless internet connectivity and a Learning Management System, the institute at which this research took place provides no other technology integration into the learning environment. So the question arises as to what it means to be a student in a technology-rich world, but a

technology-poor learning environment. Henderson et al., (2017) suggest that in this context technology is not having the transformative effect anticipated and that it is merely relegated to organisational and scheduling activities. Yet in institute-led initiatives with tablet devices, empirical evidence is provided to suggest that the use of tablets has a positive impact on learning when measured by improvement in terminal exam results (Stamm et al., 2019). This would suggest that there appears to be a rationale for institute-led initiatives to derive the maximum benefit out of tablet devices. But this needs to be balanced with the needs of students who purchase the devices of their own volition. And what of the student who does not have the means to purchase their own device? Are they going to be disadvantaged, victims of the digital divide (Helsper & van Deursen, 2017)? Before I address these questions, I now return to the present study where it is pertinent to understand what uses devices are put to currently and how this contributes to the student learning experience.

5.4.1 Self-regulation and Self-direction

Evidence emerged of participants using the technology to both regulate their own learning. One of Zimmerman's (2002) attributes of a self-directed learner is the restructuring of the physical and social context to facilitate learning. More than one participant reported using the headphones of their device to signify that they were engaging in learning and were not to be disturbed:

> *Outside the class, usually to get study in because if I don't have headphones on, people come over and talk. So I just put headphones on to study. (John)*

I suggest that the putting on of headphones is the modern-day analogue of Zimmerman's (2002) concept of restructuring the physical and social space. Given the portable nature of the tablet device, they can conceivably be used anywhere, whether that is in a busy cafeteria or on the bus. The headphones could be a 21st century equivalent of a quiet room, or perhaps a kind of "do-not-disturb" sign.

Efficient time management is another of Zimmerman's (2002) attributes of a self-regulated learner, with many participants reporting they use the organisational features of their devices to manage their busy lives.

> *The same with if I am meeting with any of the students about the societies. I had one last week, he wanted to take over the music society and I had that written in that I'd*

to meet him at whatever time, because I would have forgotten otherwise, with so much. Between the classes and the gym, myself and I'm in at different times every day, that's like, great. Put it all in (Jennifer)

But what was not clear is whether these emergent attributes of SRL and SDL that were related to the fact that participants had and utilised tablet devices, or whether they were naturally predisposed to having attributes of a self-regulated or self-directed learner. It raises the question as to whether the tablet device can nurture such attributes and use of processes in a student, which is a particularly appealing given the positive impact on learning such attributes are shown to have (Zimmerman, 2008).

5.4.2   Facilitating here-and-now learning

The evidence presented suggests that the physical attributes and technical capabilities of the device offer opportunities for here and now learning that other devices do not (Martin & Ertzberger, 2013). Ubiquitous wireless connectivity is present on other devices, such as laptops and smartphones, but neither offer the features that are as conducive to "dipping in" as the tablet devices appear to. Recurring themes among participants including the "instant on" feature and extensive battery life that facilitated their learning at a time and location of their choosing:

it [the tablet] is quick, easy and gets straight to the point (David)

The informal nature of learning within this context, at a time and location of the choice of the student suggests that engagement with the learning environment is no longer confined to the campus, nor to regular campus hours. This informality of learning is further facilitated by the networked and always-on nature of the device, with evidence presented of informal, learning-orientated social networks being formed by participants.

5.4.3   The tablet as a tool

It is apparent from participants that they are resourceful and adept at finding unique and novel uses for their device that facilitates their learning. While collaboration and communication are evident uses, it is the unique and novel uses, referred to in this study as nuggets, that differentiate the tablet device from other devices used by students. When thought of as an information gathering tool, looking at websites, reading journal articles and accessing the LMS are activities that would be expected. However, it is the activities that are

not expected such as using the screen-capture functionality (Beatrice), the camera placed on the eyepiece of a microscope (David) or the use of the camera to copy handwritten notes to be studied while travelling on a family trip (Jennifer) that differentiate the tablet device. While each of these examples cited could be undertaken with other devices, the evidence suggests that the participants undertook these activities by virtue of having their tablet device available and appear to find novel and unique ways of using the device.

But ultimately, there is no evidence to suggest the tablet device is in some way revolutionising their learning. The tablet appears to be yet another tool, with a number of participants reporting that they would manage their studies without it.

5.4.4   Engagement

As communication is a core functional of tablet devices, the opportunities afforded to participants to engage with all aspects of their programme of study are significant. This engagement consisted of many strands, with students self-organising into Facebook groups that facilitated communication and collaboration:

> *I would use Facebook (David)*

> *I go to Facebook (Richard)*

> *…brainstorming and then share it via Facebook (John)*

Engagement with lecturing staff appears to be somewhat limited to email and on occasion where the staff member uses the LMS. It does appear that the participants use the tablet extensively for such communication, sharing files that are stored on cloud services. But what is significant is whether this type of engagement could be achieved without the tablet device. As other students outside of this study were engaging with participants, it is reasonable to assume that they were also engaged and active members of Facebook groups. However, what is not clear is whether the tablet device facilitated or enabled more sustained engagement, given the attributes participants commented on such as the "pick-upness" and the instant-on features of the devices.

5.4.5   Collaboration

All participants report using Facebook for collaboration, such as working on projects, sharing files and communicating with one another. There is a pervading sense that Facebook is not

necessarily the tool of choice, but more so because it is a common platform that all students are familiar with. A number of participants reported sharing files while working on collaborative efforts:

> *iCloud/Google – to move data between devices (Christopher)*

> *as well as Google Drive. That's brilliant for storage. (Rodger)*

Again, the frequency of such collaboration is not clear, however the very fact that students are organising themselves into groups and using the tools available to collaborate offers an intriguing insight into the opportunities offered by tablet devices in this context.

5.4.6   Frustrations with technology

There is a notably balanced view on participant's perceptions of the capabilities of their tablet device. Rather than paint an overwhelmingly positive picture on the role the tablet plays in their learning 7 out of the 8 participants expressed frustrations with the technology while using their devices for academic purposes. From devices that performed software updates in the middle of taking notes in class:

> [I] *turned the tablet on, about to take notes, a 2-hour class, and Windows Update happened and for the whole two hour class (John)*

to the device performance degrading over time, to the physical layout of buttons on the device:

> *one of the things I have had a problem with, because it is quite wide, you hold it like this, and this button here, you can pop it (Rodger)*

This raises the question as to whether using devices in a manner such as these participants do outside a formal institutional programme is a missed opportunity. Because these participants have essentially developed their own digital pedagogy, outside of direction from lecturing staff, it raises the question as to whether the devices are being used to their full potential. It would appear that use of the tablet device is confined to broad and general activities (nuggets notwithstanding), rather than harnessing the functionality specific to tablet devices. For example, only one participant (Clara) reported using the Global Positioning System (GPS) functionality of her tablet device and that was entirely unrelated to an academic activity and only two of the participants reported using the rear-facing camera on their

devices. In addition, a number of participants reported not knowing about specific functionality or software that was provided by the institution, such as Microsoft Word (Richard) or Powerpoint (Jennifer) or how to get a photograph from the device to a written report (David). These findings suggest there is an opportunity for institutions to encourage BYOD by presenting training and induction activities that develop an awareness of software and support that is available.

5.4.7   Reading

Evidence of academic reading is somewhat sporadic and varied. No participant mentioned anything about the library ebook catalogue in the institution, instead referring to the occasional ebook that a lecturer would load up to the LMS:

> *you can actually go in and download it yourself, like. I just transferred it [to the iPad]. You can go and look at it, rather than going out and buying the book (Beatrice)*

The use of illegal content, specifically textbooks, is again apparent, with participants justifying the use of copies of text books on the basis of cost.But reading is not confined to just textbooks, with some one participant reading journal articles on his device:

> *I read journals (Richard)*

The fact that reading is on an ad-hoc, as-needed basis, with little or no reference to the library resources available suggests an opportunity for the institution to develop an awareness of the electronic resources available and how these resources can be accessed irrespective of device used, location or time. In addition, there is also the question of whether there is a difference between reading printed textbooks compared to reading the same material in electronic format on devices such as tablets. Some research would suggest that there is a difference in comprehension between the two (Singer & Alexander, 2017).

5.4.8   Being a student

What is apparent from the data is that there a porous boundary between being a student and being a person. The delineation between academic work and social or personal activities is particularly blurred, with activities such as informal learning, collaboration and social engagement all taking place at a time and location of the participant's choice. No longer is learning confined to formal activities within the confines of the campus, directed by a

lecturer. Opportunities for informal learning, collaboration and engagement are evidently being undertaken by participants. All of which appear to be facilitated by the tablet device.

5.5 Binding it all together – Tablet Mediated Connectedness

There is still the outstanding question as to whether the tablet device binds all of the above together to a greater extent than is possible with smartphones and laptops. There appears to be a clear delineation between tasks undertaken on the various personal devices. What is notable is that all participants had three devices with relatively clearly defined delineation between the three, despite the fact that all three offer comparable features. Tablets occupy that space of convenience between the portability of the smartphone and the functionality of a laptop. Evidence from this study suggests tablet users more likely to punctuate their social life with limited academic work, enabled and facilitated by the tablet device. Sundgren's (2017) concept of opportunistic learning appears to be feature in the Lifeworld of the participants. It does appear that the nature of the tablet device facilitates the occasional, ad-hoc engagement with fellow students, thereby broadening the learning experience.

5.5.1 The Goldilocks Gadget

The social element that emerges from the participants is that of "connectedness". The manifestation of this concept is suggested by the fact that participants reported extensive use of communication and collaboration software on their tablet devices. With an acknowledgement of the Goldilocks Gadget concept, the idea of connectedness appears even more pronounced when compared with use of their smartphone. While both devices share almost identical functionality, being primarily differentiated by physical size, the larger devices appear to facilitate more frequent communication and more notably, collaboration in an academic context. This collaboration takes the form of sharing files and information, typically via social media, with participants apparently unaware of more suitable software provided by the institution for such activities.

5.5.2 Social influence

Continuing Venkatesh's (2012) concept of social influence, family members appear to be an influencing factor in the decision to purchase tablet devices, with a number of participants reporting that family members purchased the device for them:

> *My kids … decided that they'd actually buy it [for me] (Beatrice)*

my mother bought me the iPad (David)

While the actual rationale for purchasing the device remains elusive in these cases, the decision appears to be based on naïve assumptions about the potential of such devices to contribute to the learning process by family members. When framed within the context of all participants having not only a tablet device, but also a smartphone and a laptop, it raises some relevant questions as to the perceptions of tablet devices and their utility in a learning context.

5.5.3 Communication and collaboration

The communication and collaboration aspects of tablet devices were possibly the most prominent of the uses and features to which the devices were put by the participants. Of the range of categories of software used by the participants, communications and collaboration software (including social media software) were by far the most used. Does this suggest that the device is the ideal communication device? The answer is heavily context dependent. While smartphones can be slipped into a pocket or handbag, the same cannot be said for tablets. They do, however, appear to have found their place nestled neatly between the portability of the smartphone and the functionality of the laptop. With functionality broadly comparable between smartphones and tablets, the larger screen and instant connectivity appear to be attractive features that result in the tablets being used more extensively while at home or on-campus, with the smartphone being relegated to use outside of these locations, for quick and brief communication sessions.

5.5.4 Professional communication

The concept of connectedness among participants is not just confined to friends and family and social media, with the use of the tablet device expanding from the personal into the professional in a number of cases. One participant (John) uses his device not only for professional graphic work, but also for communicating with clients while undertaking work for them.

This blurring of personal and professional appears to contribute to the participant's sense of identity as a student needing to put himself through college with part-time work. However, he also comments on the struggle he has with time management, working hard to strike a balance between his academic life and his professional life. It would appear that he may have

a financial imperative to work during his academic time, this work if facilitated by his tablet device. In addition, he uses it extensively during class time, seemingly effortlessly switching between the competing demands for his time.

Another participant (David) also actively use his tablet device while searching for jobs, reporting use of videoconferencing software (Skype) to hold initial interviews with prospective employers. The perception of the tablet device offering superior visuals and connectivity appear to play a part in the choice of device for such interviews. But again the question arises around student perceptions of the device and whether the visuals and connectivity objectively better on the tablet. While this was not investigated, it may be an artefact of Venkatesh's (2012) concept of perception of the tablet device.

5.5.5 Context collapse

The concept of context collapse occurs when multiple social settings come together in a common online space (Drennen & Burner, 2017). In the present study, it is the academic self and the personal self, linked by connectedness that appears to be primarily through Facebook. All participants reported using Facebook, but as I have discussed in section 4.5.1.3, it appears more to be because it is a common tool that other students have access to, rather than any kind of perception that the platform offers any advantage over other platforms, such as the institute Learning Management System. In line with findings from the literature (for example, see Niu, 2019 and Drennen & Burner, 2017) the use of Facebook for these participants appears to be primarily communication and collaboration, driven entirely by the participants and their fellow students and without any direction from academic staff or programme administrators. This sense of autonomy and engagement with fellow students is apparent but appears somewhat haphazard and more out of necessity and availability than through any conscious effort. Perhaps unsurprisingly, all participants reported using social media, specifically Facebook and Facebook Messenger. Facebook appears to be the most popular social media platforms (Niu, 2019), so the extent to which it is used by students is therefore unremarkable. However, there does appear to be a delineation between academic use of Facebook and general, social use. Where the delineation occurs is that not all of this use on the tablet was entirely social, a proportion of social media use was for academic purposes.

5.5.6   Social Media

Using the communication and collaboration features, participants reported using the groups, messaging and file sharing features of Facebook to communicate on broad academic matters and specifics including project and collaborative work. While using such social media sites and associated features is not unusual, perhaps what is unusual is the manner in which the various groups arrange themselves and engage in collaboration. In addition, there appears to be a broad unawareness of specific software provided for the institution that facilitates not only groups, collaboration and communication, but also close integration with office software such as Microsoft Office 365. It would appear that students are using social media sites for collaborative purposes primarily due to familiarity and also due to lack of awareness of the alternatives provided by the institution. This raises important policy implications for institutional administrators, particularly around the promotion of such collaboration and communication services. In addition, it also has implications for training of students and associated induction into the institution.

5.5.7   The student-person duality

The Lifeworld that has emerged from this research suggests there is a student-person duality, bound by a sense of connectedness that is mediated by the tablet device. The student is always connected to the internet, as is the person, the boundaries of which are blurred by this always-on connectivity. Activities that are undertaken using the tablet device appear to fall along the continuum as depicted in Figure 5.2-3, with the activities as a student blurring into activities as a person. This duality suggests that there is no one defining set of characteristics that delineates between the student and the person, rather a set of common activities, attributes and attitudes. Therefore, this duality is at the core of the Lifeworld of a student, with the tablet at the centre as the enabler and the facilitator.

5.6   Discussion

That the participants are not a homogeneous group in respect of use of tablet devices is not surprising. The range of uses to which tablet devices are put are as varied as the participant cohort. Yet there is a commonality in use, there is evidence of a range of activities that the majority of participants engage in, including communication, collaboration and entertainment. But what of educational goals? It appears evident that the participants saw their tablet device as a tool that would help them achieve their educational goals, perhaps

resonating with Entwistle & Peterson's (2004) concepts of deep learning. While the present study did not explore motivation, this characteristic did emerge as a theme during discussions. Using Venkatesh's (2012) concept of effort expectancy, concerning the degree of ease of use with the use of technology, it is apparent from participants that they hold a balanced view of their device. An overwhelmingly positive view of the tablet devices was not evident from any of the participants, suggesting that while device manufacturers have created devices with high utility, the perception is that there is no one ideal device. But it is also noted that these devices were being used outside any formal institutional programme, raising the intriguing possibility that if there was a formal programme of use in this context, with sufficient pedagogically robust practices, sufficient training for both academic staff and students, in addition to support services, whether participant's views of the devices be any different. Evidence from the literature suggest it would (Stamm et al., 2019).

5.6.1   Does that tablet define the student?

Five out of the eight participants reported they would be unable to manage their studies without their tablet device. It is apparent the device has become ingrained in their everyday practices, from notetaking, to organising, to collaboration on the academic side, to other activities, such as entertainment and social media in the non-academic side. But do such uses define the student? They do appear to define a particular type of student, or at the very minimum, a student displaying certain characteristics, namely that of a Self-Regulated Learner (Zimmerman, 1986). Evidence emerges of the tablet device being used to organise and self-monitor. I suggest the concept of Zimmerman's location for studying being analogous to a tablet user using the headphones to escape to their own virtual, private learning space that is neither time nor location dependent.

Whether the fact that the student may be more organised, may be more connected, may engage in more collaboration actually defines them as a student is open to question. Tablet functionality is contrasted to the use of other personal technology devices that offer comparable functionality. But the tablet is different to other personal technologies. The fact that the tablet is the Goldilocks Gadget may offer some clarity. Not too big, not too small, offering a wide range of functionality that appears to find a place in the toolbox available to the modern student (Elphick, 2018). But the device does not define the student. It may define

the student's *perceptions* of learning with a tablet device. (Venkatesh, 2012) found that utilitarian benefits and the level of enjoyment a person derives from using a piece of consumer technology are important drivers of use. I suggest that both these factors – the range of uses to which a device can be put, in addition to the entertainment, non-academic use are significant factors in the adoption of tablet devices by participants in this study. Furthermore, the emergence in this study of nuggets, suggest that the participants are adaptable and innovative in their use of their tablet devices.

5.6.2   Other personal devices

All participants reported having three devices – a smartphone, a tablet and a laptop. What emerges is that despite overlapping and comparable functionality, there appears to be a general delineation of activities undertaken on each device, with the occasional duplication of use. As would be expected, the smartphone is primarily used as a communication device, with some opportunistic functionality shared with the tablet device, such as Facebook Messenger and the occasional checking of emails. The tablet device has a clear role in the instant-on, instantly connected role where the checking of emails and the general browsing of the internet and the like is required. And finally, the laptop is used for the more in-depth type of work, most notably the typing up or larger bodies of text for inclusion in either reports or group projects.

But evidence also emerges as to the unique uses of the tablet device that may not be comparable to uses on these other personal devices. While watching videos, in particular paid-for content is evident on the tablet device, what is not clear is whether such content would be viewed on other devices such as phones and laptops, if the participants did not have a tablet device.

5.6.3   The detrimental effect of personal devices on educational attainment

The false notion that tablet devices are a panacea for the perceived ills of further- and higher-education is well documented in the literature (Butcher, 2016; Fabian & MacLean, 2014; Davies, 2014). As I have explored in section 2.4, what is missing is the definition of the problem technologies such as tablets are trying to solve and whether tablet devices are yet another educational technology subject to Maddux's (1986) pendulum syndrome. At primary and secondary level education, there appears to be evidence of positive impacts of tablet use

in classrooms (Clarke & Abbott, 2016; Falloon, 2014). Increased engagement, the gamification of learning and the physical characteristics of tablets are commonly reported as positive aspects of tablet use in educational environments. At higher education, where there is a greater emphasis on independent and self-directed learning, there are also positive reports of the use of tablets devices (Davies, 2014; Van Der Ventel et al., 2016; Wardley & Mang, 2016). However, there is an acknowledgement that the potential of tablet devices is not yet being realised in higher education, with a significant element of hype and hope evident (Nguyen et al., 2015).

There is broad evidence in the literature to suggest that personal technologies such as laptops and tablets during classes are detrimental to long-term retention, with resultant impact on final exam results (Ravizza et al., 2014, 2017). In addition, there is also evidence that the use of laptops has not only a detrimental effect on learning for those using the device, but also other students in the vicinity of the user who may be distracted by the student using the laptop (Sana et al., 2013). Given the relative similarities between laptops and tablet devices, it is plausible that the use of tablet devices may have a similar effect when used in a similar environment. Yet a number of studies show the positive impacts tablet use an have, for example in the attainment of educational goals (Stamm et al., 2019) and the perceived enhancement of the learning experience (Van Der Ventel et al., 2016). But the widespread use of tablets by students is not evident. In a study on note-taking by higher education students Morehead et al (2019) found that only 1% of respondents (n=577) reported using a tablet for taking notes, with the vast majority (86%) reporting that they use an notebook device. This equivocal evidence as to the effectiveness of technology is not confined to personal technologies such as laptops, tablets and phones (Livingstone, 2012).

In essence, the evidence suggests that there appears to be a delineation between formal, prescribed use of a tablet as part of pedagogical practices and the ad-hoc use outside of a formal programme, such as the participants in this study do.

The evidence that emerges from this study would suggest that to harness the power and efficacy of tablet devices their use inside the lecture theatre or classroom should be controlled and prescribed for pre-determined tasks, within a framework of institutional policy (Flanigan & Kiewra, 2018). This is not an insignificant undertaking and demands significant investment in not only time, but also training and infrastructure. The use of student-response

systems is a classic example where students are encouraged to interact at determined times by the lecturer, with clarity on where the use of personal devices is permitted and to be encouraged. But the policing of non-academic use raises a number of significant challenges for educators, not only in terms of policy but also the enforcement of such policies. There is some limited evidence to suggest the use of personal technologies can improve engagement and knowledge retention (Stamm et al., 2019; Elliott-Dorans, 2018), but this again requires significant resources to implement and successfully incorporate into the learning environment.

The evidence from this research suggests the strengths of tablet devices lie primarily outside of the lecture theatre or classroom. Several participants reported presenting draft work to lecturers on an informal basis using their tablet devices, with immediate feedback and the ability to make minor alterations during the course of conversations. Other participants reported using the devices for novel uses, described in this research as "nuggets", where the experience appears to have facilitated the learning process in a more convenient manner than with other personal devices such as laptops or smartphones. The unique features of the device, in particular the "instant on" appear to offer another example of convenience and access to information that participants reported would be more time-consuming on other devices. In addition, accessing material, whether that is in video or text format, appears to also be appealing to participants, with the screen offering the appropriate balance between size and portability for accessing such material. Participants reported widely using their tablet for accessing academic material which opens another avenue of research in terms of screen reading.

5.6.4 Just another tool

Participants do not appear to view their tablet device any different to their smartphone or laptop. To them, it appears to be yet another tool in their arsenal, no different in some ways to pen and paper. But while there is an underlying acknowledgement of the utility of tablets, there is a clear and unambiguous sentiment that these devices are a tool with a particularly unique set of features. The literature suggests that laptops were the tool of choice in higher education and have been for a number of years. Both tablet devices and laptops share a common set of features, but evidence emerging from this research suggest that there is one key feature that is of particular appeal to participants and that is the immediacy of access.

The majority of participants remarked on the difference between waiting for a laptop to power up compared to the instant-on feature of their tablet device. The speed with which participants could get underway with their task appears to be one of the more appealing aspect of the device.

5.6.5   Delineation of tasks

Evidence emerged as to the delineation of academic tasks undertaken by students when using their personal devices. The fact that all participants had a smartphone, a tablet and a laptop, suggests that no one device is suitable for all tasks that make up the Lifeworld of an undergraduate student. The tablet device appears to fall neatly into an area of student work that requires network connectivity, but relatively minor effort. Speed, expediency and immediacy appear to be the core attributes of tablet use, with the ease with which it could be picked up and switched on clearly emerging as key features of such devices. Portability and lengthy battery life also emerge as attributes that are appealing to participants. But the limitations of the device become apparent when participants were required to undertake activities that required more effort, such as a written essay or a software development assignment. The physical limitations of the device, in particular the lack of a keyboard resulted in all participants relying more on laptop devices in such situations.

5.6.6   Creativity

One theme that emerged from the research is that of creativity. Two of the eight participants actively used their devices for creative tasks, specifically graphic and visual design. While these two participants used vastly different devices, both were consistent in their beliefs that the devices facilitated a type of creativity that was superior to the more traditional paper-based approaches. In particular, the pairing of their devices with a stylus device appeared to greatly enhance their capability and facilitate new and creative ways of engaging in their practice. The evidence that emerges, while limited, offers a tantalising glimpse into the potential of tablet devices in this domain.

5.6.7   Utility

The unique features of tablet devices emerge as features that are of great appeal to participants. Factors consistently mentioned by participants include the battery life, portability and instant access. But these appear to alter some practices and further blur the delineation between the academic and the personal Lifeworld. Participants often reported

picking up the device while in non-academic situations, such as watching television at home, or reading academic texts in bed. In particular, corresponding and collaborating with fellow students using their tablet device appeared to be somewhat common and most participants were clear that this is not something they could easily do on another device, such as a phone or laptop. The convenience and immediacy of the device is a key factor.

5.7   Conclusion

Update: In the conclusion, add a small paragraph on the contribution this thesis has made to phenomenological research (in terms of design, methods, data collection, but also the limitations that were found in terms of analysis and writing up.

This research sought to uncover the lived experience of a student in a higher education institution that uses a tablet device. The participants, in some respects, are characterised by a sense of unremarkableness. No evidence emerged to suggest these participants were particularly interested in technology, nor was any evidence uncovered to suggest an emphatic belief in the power of the technology to transform their learning experience. Participants appear to view their tablet device as another tool in their academic arsenal that would not necessarily give them an advantage, but help them along their journey. Yet the uncovering of nuggets suggests an ability to harness the power and utility of the tablet device within the learning context that is not possible on other devices.

The institution where the participants studied employed a LMS, but aside from providing wireless internet access, could not be described as a technology-rich learning environment. Venkatesh (2012) suggest performance expectation is a significant factor in the adoption of consumer technologies, and some of the participants appeared to have reasonable expectations of how their device could contribute to the learning process. However, such expectations were more often than not tempered with expressions of frustration with the technology, whether that was evidenced through device failure or inability to connect to institute services, such as the wireless internet access.

But there is evidence to suggest that personal technologies, such as smartphones, laptops and tablet devices, when integrated into the learning environment can have a positive impact on not only motivation, but also perceptions, ultimately performance in terminal assessments (Stamm et al., 2019). In addition, given the physical characteristics and ubiquitous network connectivity, these devices also afford users opportunities for informal and here-and-now

learning (Fagan, 2019; Cross, Sharples, Healing, & Ellis, 2019). There is also evidence to suggest that unfettered use of personal technologies in the lecture theatre or classroom also present extensive opportunities for distractions, off-task activities, impacting not only the user, but also those in the vicinity, again with resultant impact on academic achievement (Sana et al., 2013; Ragan et al., 2014). What is not clear is whether the attributes, characteristics and impact smartphones and laptops have on learning can equally apply to tablets. It can only be suggested that given the relatively similar functionality of tablet devices, that there are comparable opportunities to either positively or negatively impact the learning environment, depending on context and use. Therefore there are significant implications for educators, policy makers and students alike. Expectations of tablet devices to revolutionise the learning environment need to be carefully tempered with empirical evidence as to their effectiveness. While initial perceptions of tablet devices appeared to succumb to elevated expectations (e.g. see Nguyen et al., 2015) of new technology that Maddux (1986) warned about, more recently there does appear to be some evidence of successful utilisation of tablet devices in higher education (Van Der Ventel et al., 2016; Stamm et al., 2019). But measuring the impact of tablet devices for undergraduate students who purchase devices of their own volition as yet remains a very under-researched area. This study has sought to illuminate what such students use their devices for, and in many respects is only a first step at understanding the potential of tablet devices used in this context. A wide range of uses have been revealed, some as would be expected and that have been reported in the literature before, some that would not have been expected and appear to be notably context dependent. The Lifeworld that has emerged is one of a duality of existence, that of the student and that of the person, inextricably bound by the networked Lifeworld, mediated by the always-connected, always-on tablet device.

The focus of this research was to uncover the lived experience of undergraduate students using tablet devices. Social networking in particular, has emerged as a key usage of tablet devices, with participants engaged in collaborative efforts to complete academic work. It has been suggested that these social network sites offer opportunities for larger and more varied networks, from which users can draw resources and put themselves at an advantage (Helsper & van Deursen, 2017). But what of the undergraduate student who does not have the means to purchase a personal technology device such as a tablet? Some studies have encountered

reluctance from faculty for this very reason, with a strong resistance to incorporating iPads into the learning environment so as not to disadvantage students who did not have the means to purchase one (Aiyegbayo, 2015). With evidence to suggest that tablet use in a controlled, formal programme can be successful by a range of measures (Stamm et al., 2019; Elliott-Dorans, 2018; Wakefield et al., 2018), there is little or no evidence to suggest comparable success for students who purchase such devices of their own volition. Therefore, this is proposed as one area for future research.

5.8   Contribution of this study

The potential of tablet devices is already being realised to an extent, with a range of studies evidencing the positive contribution such devices have made in a range of learning contexts (e.g. see Falloon, 2015; Davies, 2014; Stamm et al., 2019). While this study did not set out to measure impact on learning, it did seek to investigate tablet devices in Higher Education, to see what part the devices play in a typical student's life. What it uncovered are a range of uses, both expected and unexpected, that give a glimpse of the potential of tablet devices, but from a student perspective.

It appears that the tablet device falls into a category of being not too big, yet not too small, giving rise to the metaphorical device that I call the Goldilocks Gadget. This concept neatly encapsulates the physical attributes of the device, in addition to the functionality such as "instant on" that facilitates a new type of activity that one of the participants dubbed "dipping in". The students themselves are characterised as being always connected, notably through social media, and are adept at using their devices to achieve their learning objectives. While most of these activities could be carried out by other personal devices, it is the characteristics of the tablet that afford students opportunities to work in ways that are more efficient, less time consuming and ultimately, more convenient. Tablet devices appear to offer students opportunities to undertake their academic work at a time and location that is convenient, while also offering them the opportunity to relax and be entertained.

But this study also leaves a lot of questions unanswered. The difference between laptops and tablets in the educational context still remains unresolved, particularly in light of the research that suggests laptops have a detrimental effect on learning. The link between tablet use and Self Regulated Learning offers a tantalising glimpse into the potential of tablet devices to objectively improve learning by helping students become more organised and to track their

progress. Note-taking also emerged as an activity that warrants further investigation, particularly in light of more recent developments in tablet design and the inclusion of a stylus with premium models. I discuss these items further in section 5.10.

5.8.1   Implications for institutions implementing tablet programmes

As I have discussed in section 2.5, there are many examples in the literature of successful implementations of tablet initiatives, the majority of which are via institute-mandated programmes (e.g. see Falloon, 2015; Elliott-Dorans, 2018; Stamm, Triller, Hohoff, & Blanck-Lubarsch, 2019). The findings of this research would not contradict the literature in this regard. While the present study cannot make any claims as to the impact of tablet devices on achievement, it has uncovered some novel and unusual uses that may offer some insights into how the devices can be used by undergraduate students. Tablets by their very nature are a trade-off between portability and functionality, yet the evidence emerging from this research would suggest they have potential in an academic environment. However, to harness the maximum benefit from tablets, a wide range of supports and policies are necessary (Flanigan & Kiewra, 2018). In addition, there is an abundance of research on the use of laptops in higher education, it is not clear whether the findings of such research can equally apply to tablet devices also. But as acknowledged by many studies (Nguyen et al., 2015; Wakefield et al., 2018) we are still in the early days in relation to research with tablet devices.

5.9   Phenomenology in Educational Technology research

Miles et al., (2014, p.11) note that the strength of well-collected qualitative data is the ability to elicit "*naturally occurring, ordinary events in natural settings*". The goal of this study was to investigate undergraduate use of tablet devices in such natural settings – the campus cafeteria, the lecture theatre, the bedroom or the bus. While a number of other interpretive paradigms could have been chosen, for reasons outlined in section 3.4, I felt Phenomenology provided a suitable philosophy and associated methodology to investigate the phenomenon of tablet use in the natural settings that form the student Lifeworld. Van Manen suggests that for a study to be truly phenomenological in nature, it must commence with a question that is framed as a phenomenological question (van Manen, 2014, p.297). The development of the Research Question in this study was explicitly designed within this context and provided a

robust foundation for the research design. This combination of the appropriately formed Research Question, in combination with Seidman's three interview model, elicited the rich data needed provided a deep insight into the undergraduate Lifeworld, within the context of tablet device use.

There were, however, inherent conflicts between Phenomenology as a philosophy and the demands of qualitative research, most notably in relation to generalisability. As Van Manen (2014, p. 352) notes, the only generalisation permitted is "never generalise". Yet as Lincoln and Guba (quoted in Schwandt, 2015) note the matter of generalisability of findings can be achieved by providing thick descriptive data that will permit readers to evaluate whether the findings can be applied to comparable contexts. The necessity to provide such a narrative on the findings resulted a deviation from analysis in the Phenomenological sense to a more conventional thematic analysis using iterative coding techniques (Miles et al., 2014, p.71). In addition, the narrative resulted in a further deviation from phenomenological writing, which is typically heavily influenced by its philosophical underpinnings.

As Maxwell (2013, p.87) notes, there is no "cookbook" for qualitative research design. What this study has demonstrated is that Phenomenology is a suitable instrument for designing research in the context of educational technology in Higher Education. Using the cookbook metaphor, it can be successfully combined with alternative means of data analysis and interpretation to present findings that are not only credible, but ultimately make a valid contribution to the body of knowledge in the area.

5.10 Future research

The present study uncovered a number of areas that would appear to provide opportunities for future research using tablet devices. That participants unwittingly displayed a number of characteristics of self-regulation offers a potential to investigate if there is a connection between tablet use and SRL. Distractions offer another opportunity, with tablets offering comparable functionality to laptops, but no clarity as to the impact on learning. Tablets, with their physical characteristics superficially similar to a paper notepad, in conjunction with an electronic stylus may offer another avenue for exploration in the area of creativity. At first glance, it would appear that such creativity would not be possible on a laptop, therefore presenting a unique opportunity for research. It is not uncommon to see laptops in the

lecture theatre, with the vast majority of users taking notes when they are on task. While the differences between taking notes on paper compared to laptops has been documented (P. A. Mueller & Oppenheimer, 2014), the use of a tablet, particularly with the use of a stylus, may offer another avenue for research.

As this research has uncovered, the use of social media sites such as Facebook is extensive, raising the question as to whether use on a tablet device differs from use on other personal technologies such as smartphones or laptops.

5.10.1 Comparison with laptops

The very nature of rapidly evolving technology may offer additional opportunities for research, as the delineation between tablet devices and laptops increasingly becoming blurred (Low, 2019). Tablets are now increasingly offering comparable features to laptops, such as physical keyboards, while retaining the appealing features of tablets such as instant-on and longer battery life. As I have discussed in section 2.14, there is a substantial body of research on the use of laptops, particularly in higher education where students purchase the devices of their own volition. An opportunity to investigate if the findings on laptop use offer any parallels with tablet use could provide fertile ground for research.

5.10.2 Self Regulated Learning

Zimmerman's (2002) concept of SRL describes eight key attributes of successful learners that engage in specific actions that appear to result in academic success. While the focus of this study was not SRL, a number of participants exhibited some attributes that are congruent with the concept of a self-regulated Learner. The organisational features of the tablet devices, such as communication and in particular calendar function facilitates student planning and engagement with the learning process.

What is not clear from the research is whether participants would exhibit elements of SRL if they did not use or own a tablet device. It is not unreasonable to assume that the participants are simply utilising the features of the device and unwittingly engaging in elements of SRL such as planning and self-evaluation. While Zimmermann argues that the attributes that make a Self-Regulated Learner can be taught, it opens up the intriguing question as to whether tablet devices could play a role in enhancing self-regulating techniques for learners, with consequential improvements in learning attainment.

5.10.3 Distractions

There is a significant body of evidence to suggest that using laptops in the lecture theatre is detrimental to not only the concentration of the user, but also of those around the user (e.g. see (Elliott-Dorans, 2018; Sana et al., 2013). But it is unclear as to whether the same can be said for tablets. One participant (Rodger) in this study comments on how during a lecture, the lecturer instructed all students with a laptop to put them away, but did not issue the same directive for users of tablets who were evident in the lecture theatre.

There is evidence to suggest that even when students are instructed to keep tablet devices flat on the table in front of them, they still have a detrimental impact on the learning environment (Carter et al., 2017). But the findings of such studies do not directly attribute the results specifically to distractions, but merely to the presence of such technologies, with the implications being that they are responsible for lower terminal assessment results. Therefore, the area of distractions when using tablet devices would appear to offer opportunities for future research.

5.10.4 Creativity

Two participants (Christopher and John) reported using their tablet device specifically for creative, mostly graphic design, purposes. The physical attributes of tablet devices certainly appear to be comparable with traditional notepads, and the addition of stylus devices that mimic traditional pens. Both participants offered particularly vivid descriptions of how they used their devices for creative purposes, with both, perhaps unsurprisingly, particularly enthusiastic about the potential of tablet devices for visual imagery. There is some evidence in the literature as to the use of iPads in art education (Souleles et al., 2017), though with the advent of devices such as the Apple Pencil (Apple, 2018), there may be an opportunity for research into as yet unrealised creative endeavours with tablet devices.

5.10.5 Facebook for engagement

All participants reported using Facebook as a communication and collaboration tool during their studies. There appeared to be very much a sense of participants using it because it was what they were familiar with, rather than because of any perceived benefit of the platform. While extensive research has been undertaken in using Facebook as a learning environment

(for example, see Niu, 2019, Madge, Meek, Wellens, & Hooley, 2009), the findings from the literature would suggest that while students would have concerns around formally using the platform as part of a programme of study, there may be an opportunity to utilise the platform on a more informal basis as a learning and collaboration environment in the institution, to supplement the LMS. In addition, Niu (2019) suggests that using the platform in an administrative capacity, such as to make course announcements, would be welcomed by students. However, caution is urged as the lines between personal and private lives of students become more porous in the era of social media and ubiquitous connectivity.

5.10.6 Note-taking

There is a significant body of empirical evidence suggesting that taking notes on a laptop is different to the processes that a student would normally undertake while taking notes by hand, resulting in lower retention and recall ability (P. A. Mueller & Oppenheimer, 2014). While the same could possibly be said about taking notes using a tablet with an attached keyboard, students who use a tablet device, with a pen-like stylus to take handwritten notes may offer an intriguing opportunity for research. Mechanically, the processes engaged would appear to be comparable, yet the medium (electronic vs. paper) is notably different. Morehead, Dunlosky, & Rawson (2019) suggest that taking electronic notes on an eWriter device is comparable to taking notes on paper. However, such devices differ greatly from tablet devices. A more appropriate avenue for research would be to investigate the efficacy of students taking paper-based handwritten notes compared to electronically hand-written notes on a tablet device.

5.11 Limitations

Participants in this study were self-selecting owners of tablet devices, enrolled in a higher education institution on undergraduate programmes. While the phenomenological method used for data gathering demands that participants have significant experience of the phenomena under investigation, this has to be tempered with the acknowledgement that volunteers may be advocates and enthusiasts of tablet devices and therefore give an unflatteringly positive view of the technology. This is tempered by ensuring that the participants were aware that a truthful and honest depiction of their experiences using the devices was requested and that there was no incentive for them to only speak positively of their device. In addition, participants were specifically asked about negative experiences of

using their devices. Seidman (2012) further suggests that the three-interview method mitigates such fears when analysed to see if participants are actually giving thought to what they are saying and if there is a consistency in the message across the three interviews.

Phenomenology demands a rich narrative from the participants. It demands a lucid, vivid and detailed description of the pre-reflective lived experience. To elicit such responses took extensive questioning, requiring extra effort on my part to avoid leading questions. Non-native English-speaking participants in particular struggled with the demands of the methodology, with many questions having to be repeated, enunciated or broken down into smaller components. However, this was tempered by an acknowledgement of these difficulties, taking extensive notes and cross-referencing them with the recorded conversations to reaffirm my understanding.

This research purposely selected elements of Phenomenology, while adhering to the Interpretivist philosophy of undertaking research. Accordingly, it is open to critique that it is not a Phenomenological study in the purest sense.

Appendix 1 – Sample NVivo change log

Logged	Name	Location	Event	Detail
04/03/2018 10:14	Using - Technology	Nodes	Modified	Renamed from Technology use
04/03/2018 10:14	Being - Self	Nodes	Modified	Renamed from Self
10/02/2018 12:30	sterile	Nodes	Deleted	
13/01/2018 14:40	Policy	Nodes	Deleted	
13/01/2018 14:39	Self\Student Unaware	Nodes	Modified	Moved from Nodes
13/01/2018 14:39	Self\Institutional	Nodes	Modified	Moved from Nodes
26/11/2017 12:06	Time Management	Nodes\\Self	Deleted	
26/11/2017 12:06	Technology use\Has Phone and Tablet and Laptop	Nodes	Modified	Renamed from Phone_Tablet_Laptop
26/11/2017 12:05	Keyboard	Nodes\\Technology use	Deleted	
26/11/2017 12:05	Preference for electronic notes	Nodes\\Technology use	Deleted	
26/11/2017 12:05	Tablet - taking notes	Nodes\\Technology use	Deleted	
26/11/2017 12:04	Technology use\Taking notes	Nodes	Created	
26/11/2017 12:02	Technology use\Preference for electronic notes	Nodes	Modified	Moved from Nodes
26/11/2017 11:57	Self\A gift	Nodes	Created	
25/11/2017 12:00	Laptop	Nodes\\Technology use	Deleted	
25/11/2017 12:00	Phone	Nodes\\Technology use	Deleted	
25/11/2017 12:00	Technology use\Phone_Tablet_Laptop	Nodes	Created	
25/11/2017 09:26	Technology failure	Nodes\\Technology use	Deleted	
18/11/2017 14:24	Technology use\Context dependent use	Nodes	Modified	Renamed from Context dependant use
18/11/2017 14:23	Technology use\Context dependant use	Nodes	Modified	Renamed from Context sensitive use
18/11/2017 12:29	Self\Distractions	Nodes	Created	
13/11/2017 19:02	Finger	Nodes\\Technology use	Deleted	
13/11/2017 19:02	Tablet	Nodes\\Technology use	Deleted	
13/11/2017 18:56	Missing Capability	Nodes\\Technology use	Deleted	

12/11/2017 11:46	Software\dictionary	Nodes	Modified	Renamed from Software - dictionary
12/11/2017 11:46	Software\Software - dictionary	Nodes	Modified	Moved from Nodes
12/11/2017 11:45	Software\Other communication\Software - dictionary	Nodes	Modified	Moved from Nodes
12/11/2017 11:36	Software\Other communication	Nodes	Created	
12/11/2017 11:17	Software\Google Translate	Nodes	Created	
11/11/2017 09:45	Policy\Institutional	Nodes	Modified	Renamed from Organisation
11/11/2017 09:30	Self\Grey area	Nodes	Created	
11/11/2017 09:27	Technology use\Organising work	Nodes	Created	
11/11/2017 09:27	Technology use\Showing work on the tablet	Nodes	Modified	Moved from Nodes
11/11/2017 09:26	Technology use\Collaboration	Nodes	Created	
11/11/2017 09:17	Technology use\Sharing files or information	Nodes	Created	
11/11/2017 09:09	Technology use\Context sensitive use	Nodes	Modified	Renamed from Unique use
11/11/2017 08:38	Technology use\Reading - other	Nodes	Created	
11/11/2017 08:38	Technology use\Reading - ebooks	Nodes	Created	
11/11/2017 08:37	Technology use\Reading - notes	Nodes	Modified	Renamed from Reading notes
11/11/2017 08:34	Self\Traits of SRL	Nodes	Modified	Moved from Nodes
11/11/2017 08:34	Self\Traits of SDL	Nodes	Modified	Moved from Nodes
11/11/2017 08:34	Traits of SDL	Nodes	Created	
11/11/2017 08:33	Traits of SRL	Nodes	Modified	Renamed from Traits of SRL or SDL
11/11/2017 08:33	TP~ Ok, so, as I (2)	Nodes	Deleted	
11/11/2017 08:33	TP~ Ok, so, as I	Nodes	Deleted	
19/10/2017 20:07	Technology use\Tablet - taking notes	Nodes	Modified	Moved from Nodes
19/10/2017 20:07	Technology use\Tablet - following lecturer's slides	Nodes	Created	
19/10/2017 20:06	Tablet - taking notes	Nodes	Created	

19/10/2017 20:06	Technology use\Watching Video - entertainment	Nodes	Modified	Moved from Nodes
19/10/2017 20:06	Technology use\Watching Video - academic	Nodes	Modified	Moved from Nodes
19/10/2017 20:05	Policy	Nodes	Modified	Modified Properties
19/10/2017 20:05	Self	Nodes	Modified	Modified Properties
19/10/2017 20:05	Software	Nodes	Modified	Modified Properties
19/10/2017 20:05	Watching Video - academic	Nodes	Created	
19/10/2017 20:05	Watching Video - entertainment	Nodes	Created	
19/10/2017 20:04	Technology use\Dipping in	Nodes	Created	
19/10/2017 20:03	Self\Showing work on the tablet	Nodes	Created	
19/10/2017 20:02	Self\Perceived Effectiveness of a use of the tablet	Nodes	Created	
19/10/2017 20:02	Technology use\Missing Capability	Nodes	Created	
19/10/2017 20:01	Self\Work Life Balance	Nodes	Created	
19/10/2017 20:01	Technology use\Unique use	Nodes	Modified	Moved from Nodes
19/10/2017 20:00	Unique use	Nodes	Created	
19/10/2017 20:00	Technology use\Other Peripheral	Nodes	Modified	Renamed from Peripheral
19/10/2017 19:59	Technology use\Laptop	Nodes	Created	
19/10/2017 19:59	Technology use\Tablet	Nodes	Created	
19/10/2017 19:59	Technology use\Phone	Nodes	Modified	Moved from Nodes
19/10/2017 19:59	Self\Phone	Nodes	Created	
19/10/2017 19:59	Self\Time Management	Nodes	Modified	Moved from Nodes
19/10/2017 19:58	Self\Technology frustration	Nodes	Modified	Moved from Nodes
19/10/2017 19:58	Self\Nugget	Nodes	Created	
19/10/2017 19:58	Self\Profound Statement	Nodes	Created	
19/10/2017 19:58	Self	Nodes	Created	
19/10/2017 19:57	Technology use\Technology frustration	Nodes	Created	

19/10/2017 19:57	Technology use\Technology failure	Nodes	Created	
19/10/2017 19:57	Policy\Organisation	Nodes	Modified	Moved from Nodes
19/10/2017 19:57	Organisation	Nodes	Created	
19/10/2017 19:57	Policy\Student Unaware	Nodes	Created	
19/10/2017 19:56	Technology use\Time Management	Nodes	Modified	Moved from Nodes
19/10/2017 19:56	Time Management	Nodes	Created	
19/10/2017 19:55	Software\Cloud Storage	Nodes	Created	
19/10/2017 19:55	Software\Skype	Nodes	Modified	Moved from Nodes
19/10/2017 19:54	Skype	Nodes	Created	
19/10/2017 19:53	Software\Facebook Messenger	Nodes	Created	
19/10/2017 19:53	Software\Facebook	Nodes	Created	
19/10/2017 19:53	Software\Email	Nodes	Created	
19/10/2017 19:52	Software	Nodes	Created	
19/10/2017 19:52	Software	Nodes\\Technology use	Deleted	
19/10/2017 19:52	Technology use\Software	Nodes	Created	
19/10/2017 19:51	Technology use\Peripheral	Nodes	Created	
19/10/2017 19:51	Technology use\Headphones	Nodes	Created	
19/10/2017 19:51	Technology use\Keyboard	Nodes	Created	
19/10/2017 19:50	Technology use\Finger	Nodes	Created	
19/10/2017 19:50	Technology use\Stylus	Nodes	Created	
19/10/2017 19:48	Technology use	Nodes	Modified	Modified Properties
19/10/2017 19:47	Traits of SRL or SDL	Nodes	Modified	Modified Properties
19/10/2017 19:47	Policy	Nodes	Created	
19/10/2017 19:46	Technology use	Nodes	Created	
19/10/2017 19:46	Traits of SRL or SDL	Nodes	Created	

Appendix 2 – Ethical Approval

Durham University
School of Education

Shaped by the past, creating the future

26 August 2016

Trevor Prendergast
trevor.prendergast@durham.ac.uk

Dear Trevor

The lived experience of table usage among undergraduate students

I am pleased to inform you that your ethics application for the above research project has been approved by the School of Education Ethics Committee.

May we take this opportunity to wish you good luck with your research.

Yours sincerely,

Dr Nadin Beckmann
School of Education Ethics Committee Chair

Leazes Road
Durham, DH1 1TA
Telephone +44 (0)191 334 2000 Fax +44 (0)191 334 8311
www.durham.ac.uk/education

To: Trevor Prendergast, Head of Department of Accounting and Business Computing

From: ██████████ Chair Research Ethics Committee, ●

Date: 3 October 2016

Re: The Lives Experience of Tablet usage among undergraduate students. Trevor Prendergast

The Committee reviewed the above application recently submitted.

Committee are happy to grant ethical approval subject to the following corrections/clarifications:

1. ██ version of Consent Form must be on ██ headed paper
2. Section 8. Question raised on how long records will be retained. Copy of Data Retention Policy attached.
3. For classroom scenario all participants must sign consent form.

If you have any questions please do not hesitate to contact me.

Kind Regards

Mary McDowell/Naughton

Dr ████████
CHAIR

Appendix 3 – Informed Consent form

<div align="right">16th January 2017</div>

Participant Information Sheet

Title: *The lived experience of tablet usage among undergraduate students*

You are invited to take part in a research study of tablet usage during undergraduate studies. Please read this form carefully and ask any questions you may have before agreeing to be in the study.

The study is conducted by Trevor Prendergast as part of his postgraduate studies at Durham University, UK. This research project is supervised by Dr. Julie Rattray (Julie.Rattray@durham.ac.uk) from the School of Education at Durham University.

The purpose of this study is to gain a better understanding how undergraduate students utilise tablet devices during their studies.

If you agree to be in this study, you will be asked to participate in a three interviews, each lasting 90 minutes. In addition you will be asked to gathering some supplementary data using your tablet device. This data can include photographs relevant to your studies, audio recordings, video recordings or any other multimedia content that you feel is relevant and can be generated using your device. All interviews will be recorded.

Your participation in this study will take approximately three weeks.

You are free to decide whether or not to participate. If you decide to participate, you are free to withdraw at any time without any negative consequences for you.

All responses you given or other data collected will be kept confidential. The records of this study will be kept secure and private. All files containing any information you give are password protected. In any research report that may be published, no information will be included that will make it possible to identify you individually. There will be no way to connect your name to your responses at any time during or after the study.

If you have any questions, requests or concerns regarding this research, please contact me via email at trevor.prendergast@dur.ac.uk or by telephone at +XXXXXXXXXXXX.

This study has been reviewed and approved by the School of Education Ethics Sub-Committee at Durham University (date of approval: 26/08/2016)

Sincerely,

_____ Date: _____

Trevor Prendergast

Declaration of Informed Consent

☐ I agree to participate in this study, the purpose of which is to gain a better understanding how undergraduate students utilise tablet devices during their studies.

☐ I have read the participant information sheet and understand the information provided.

☐ I have been informed that I may decline to answer any questions or withdraw from the study without penalty of any kind.

☐ I have been informed that all of my responses will be kept confidential and secure, and that I will not be identified in any report or other publication resulting from this research.

☐ I have been informed that all interviews will be recorded

☐ I have been informed that the investigator will answer any questions regarding the study and its procedures. Trevor Prendergast, School of Education, Durham University can be contacted via email: trevor.prendergast@dur.ac.uk or telephone: +353 86 125 0751

☐ I will be provided with a copy of this form for my records

Any concerns about this study should be addressed to the Ethics Sub-Committee of the School of Education, Durham University via email (Sheena Smith, School of Education, tel. +44 191 334 8403, e-mail: Sheena.Smith@Durham.ac.uk).

_____

Date   Participant Name (please print)   Participant Signature

I certify that I have presented the above information to the participant and secured his or her consent.

_____

Date   Signature of Investigator

Appendix 4 – Schedule of questions

Not looking for an opinion – looking for experience

Tell me a story

Get concrete details

Sample Questions

Interview 1 – about the participant (Focused Life History – to set the context)

What is your programme of study?

What year of your programme are you in?

How long is your commute to <college>?

Tell me about your studies – your programme, the subjects you are studying and why you chose this area

~~Tell me about the workload of your programme, do you think it is too much, too little?~~

Do you study much outside of class time? Describe a typical study situation outside of the classroom, such as the location, the timing, whether you were with anyone.

Experience with technology prior to tablet – would you describe yourself as a technology enthusiast?

How long have you had your device?

What make/model is your device?

Have you had other devices?

Do you change often?

Do you use any peripherals? (E.g. stylus, headphones, keyboard, etc.)

Typically would you use only Wi-Fi or do you use both Wi-Fi and 3G/4G? (relevant for situated learning)

Take me through a typical day in your life as a student, from the moment you get up until the moment you go to bed (within reason!)

Interview 2 – the lived experience

Tell me about why you bought the device. What attributes appealed to you over other similar devices, such as a laptop?

List your top three used apps

Give me examples of where you would use your device (location, not situations)

Are there particular features of your device that you like? Why is that so?

Are there particular features of your device that you dislike? Why is that so?

Why did you decide to buy a device for your studies? Tell me about the experience of buying the device - what you considered, what were the factors involved, how quickly did you decide?

Describe in detail how you use your device as part of your studies

Is there a particular time you used your device that stands out, for whatever reason? Tell me about that particular experience.

Tell me about the first time you used your device during your studies?

Can you tell me about a recent time you used the device and you felt it made a positive contribution to your learning process? How did it make you feel?

Can you tell me about a time you used the device as part of your studies and it did not quite work out as well as you would have hoped? How did it make you feel?

Is there a particular subject in your studies that you feel the device is more useful for? Why?

~~You have created media 1 (e.g. photograph, video, screenshot, recording, etc.), tell me about that media and how it represents the how you use your device.~~

~~You have created media 2 (e.g. photograph, video, screenshot, recording, etc.), tell me about that media and how it represents the how you use your device.~~

~~You have created media 3 (e.g. photograph, video, screenshot, recording, etc.), tell me about that media and how it represents the how you use your device.~~

Tell me about where you usually use the device – describe those situations. Why those locations?

Describe the issues you feel you have as a student in terms of learning. As in what, challenges you face in completing your studies. How does the device help in overcoming these challenges?

Tell me about a time you experienced technical issues. What were these issues? How did these issues make you feel? Did these issues get resolved? How were they resolved? Did you resolve them or did you need to get help from somebody?

Interview 3 – Reflection

How do you think the device contributes to your learning?

How does using the device to learn make you feel about your learning? About being a student?

Would you recommend other students use tablet devices during their learning?

When you finish your studies and graduate, do you think you will continue using the device? For what?

Do you have anything final to add? Anything we have not spoken about that you think would be important?

Appendix 5 - Sample Interview Transcript

5.12 Interview #3 – Rodger – 28th March 2017

TP: Just to recap, ok? So we first of all talked about the way you use the stand, and when you use the tab to review code and stuff. Isn't that right?

Rodger: Uh-huh.

TP: And I mean, portrait, you get more vertically.

Rodger: Yes

TP: and it is interesting, you are not the first to say that about code. And I won't get into the specifics of APIs, but you did give the example of when you are looking at APIs, isn't that correct?

Rodger: Yes.

TP: It's so detailed, so you can have it there on [screen]. And we talked about Unity and stuff like that. The next one then was the, I suppose the general why a tab. And I have here in quotes, it's handier.

Rodger: Yeah.

TP: That's just it's easier to use in so far as it turns on immediately, and physically – yours is 10-inch, is that right?

Rodger: 10.5 inch.

TP: 10.5, yeah. The Samsung A, that's right. So in terms of general… I put down ergonomics. You mentioned you send emails exclusively from the tab, is that right?

Rodger: Eh, yes, pretty much.

TP: Pretty much, yeah. And then reading notes and stuff like that, yeah. And then we kind of turned on to the reading, this is something that came out that I thought was fascinating. So generally, I think we said more accessible, the device itself, you find it more accessible. Is that right? PDF, Powerpoint… it's interesting what you said about being "less distracted". You feel less distracted on the tab, is that right?

Rodger: Yeah.

TP: Yeah, that's an interesting one all right, I was looking back over that and thinking ok. And then we kept going on into the ecomics. We talked about Marvel, and these are short, typically 26-30 pages, is that right?

Rodger: Em, yeah.

TP: And that is, I suppose, your "release"?

Rodger: Uh-huh.

TP: You just switch off and use the tab for something other than college work, is that right?

Rodger: Pretty much, yeah.

TP: And then, another theme that is coming out in terms of ebooks, specifically the cost of them, you felt, and you are not alone I think, that if there were of a reasonable subscription, or a reasonable price, not exorbitant prices as they are now, you would most likely… would I say most likely consider, or you would pay if reasonable, is what I have written here.

Rodger: Em, yeah, it's one of those things, it's not that I am not interested in buying books, I am. It's just that I can't sacrifice the food on the table to afford them. I would love to have access to them, I think it would be quite beneficial if people could, but it is just not an option for the vast majority of students.

TP: So some kind of model, of even a tenner a month, maybe, or something even lower cost to buy them, that kind of thing. That's for the subscription service, then. And then we moved on to something which I completely misinterpreted, learning languages such as German, just for the sake of it, as opposed to being specifically connected to your course. Is that correct?

Rodger: Kinda both.

TP: But do you take German in the course, though?

Rodger: No.

TP: You know it is available, some courses have it as an elective.

Rodger: Mmmm

TP: So it is just, your own … I have here for the sake of it, but it is for your own interest, isn't that right?

Rodger: That's one of the things the tab has, though. Because I use a lot of folders on it, so if I have like games, or Word, in Microsoft Office, it is all one. Then the DuoLingo app I use for learning German, that's just there. So it's constantly in my eye-line.

TP: It's just there. And it then gives the reminder to do it. Roughly how long per week would you spend on that? I didn't ask you that.

Rodger: Em, I do most days, five- to ten minutes.

TP: Right.

Rodger: I might miss a day here and there, but that's roughly it.

TP: Yeah, but it's just general. So five to ten minutes, most days, switch the mind off, and into something totally different. Roughly five to ten minutes a day, ok. Then we moved into the whole area of learning in general. In terms of the gamification of learning that you use, you mentioned Java, C#, by doing little bits and pieces, it is unplanned, informal kind of learning, with small snippets of things to do, activities…

Rodger: Uh-huh.

TP: …and you feel that the gamification of that, the kind of … the incentive is there to keep going, to learn more, to get better.

Rodger: It is very effective when you are dealing with a perishable skill. That's the real thing. I think I mentioned this before, instead of modularising things, you are doing your bits and pieces along the way. You are constantly referring back.

TP: Yeah.

Rodger: So you are creating a better skillset, and a more rounded person than just having this test, this test, this test…

TP: So is it fair to say that more in learning terms that the dip-in, self-service, all-you-can-eat as opposed to, as you say, the modularised, prescribed route through learning, is that fair?

Rodger: Yeah, I think so. It's handy enough. Like, obviously the modularised thing is good, because it paces things and there is a reason it is there.

TP: Yeah.

Rodger: But just having additional stuff… like I've always been a huge supporter of worksheets. Or even, for lack of a better term, homework. "Here's what we have covered in class – you are not going to get assessed on this whatsoever, but here is 10 versions of what we have just done, do them 100 times". It's that kind of thing.

TP: Yeah, we call it formative assessments, where you don't actually get marks for it, but if you were to give it back to the lecturer, would you get feedback on it? As in, you got this right, you didn't get this right? Would they give you feedback?

Rodger: Oh yeah, sure.

TP: That's a kind of formative learning there.

Rodger: You could even build it into the software

TP: Yeah

Rodger: Like, this is where you went wrong….

TP: Yeah. I suppose software, more than any language, there are potentially any number of ways you could do the same thing, some more efficient than the others. And getting that subjectivity in there would be a challenge.

Rodger: It's not too bad.

TP: Yeah

Rodger: There's easily quantifiable things to do with code, and stuff. Like, how quick does it run, how many loops were involved…

TP: Yeah, those quantifiable…

Rodger: Like, if you know this is the way of doing it, that's you standard that you can reduce down for.

TP: yeah.

Rodger: And it helps the student as well. Because, for example, if I was doing it and I got 70%, that then forces me to go "why didn't I get 100%?" Do it again. Try it again. You end doing it through different ways. You become more versatile, and not … you don't become one-dimensional – "This is how I do one thing."

TP: And that's a key skill – that there is not just one way of doing things.

Rodger: Yeah.

TP: Yes, there are more efficient ways…

Rodger: And there are circumstantial ways, where one way would be better than another.

TP: Yeah.

Rodger: …even though they do the same thing.

TP: And do you think then, it was one of the questions I was going to ask you, do you think there is scope for institutions such as AIT to incorporate this kind of learning into courses?

Rodger: Oh, massively. You see it's out there. There are companies that are doing this, and they are top of the app store. They are getting downloads, they are making advertisement revenue back. It's the kind of thing as well that if it was properly invested in, properly constructed, you could end up getting a pretty decent tool out of it. And you could apply it to pretty much anything, but it would need to be designed by people who knew what they were doing.

TP: Content experts, yeah. With learning theory people, as well.

Rodger: Yes, I was going to say it is actually "know how to teach a subject"

TP: It's not enough to just know the content.

Rodger: Because that is one of the things that does cause problems, with ourselves. Like, we have had one or two lecturers that have been given a module that they know what they are talking about, but their ability to transfer the information to the student is an issue. And we have had to do a massive amount of outside learning from college, which has affected attendance.

TP: Right.

Rodger: It is one of those problems that can cause severe problems down the line.

TP: In terms of the learning? Yeah, I know what you mean. So there is potential there.

Rodger: Plus, student confidence is another one, you know?

TP: Confidence or competence?

Rodger: Confidence. Like if you genuinely believe that one of your lecturers is incompetent, or not capable, it is essentially wasting your time. You are not going to pay attention to the things they do right.

TP: It's not that you don't trust them, but you wonder. You question, is that valid? Is that correct? Is what they are telling me right?

Rodger: We had an instance of that before, he was getting stuff copied and pasted from the internet.

TP: Here?

Rodger: Oh yeah. And now, in his defence, he was handed a module that wasn't his thing whatsoever. But at the same time, we were getting assessments based on this stuff that he was not really explaining very well and we were second years. We weren't up to scratch at all on this sort of stuff.

TP: Right, so he wasn't setting you up properly for the exam?

Rodger: Yeah, we just felt that this was a physical format, or a software based format, it's there, you don't need to worry about that. You don't need to worry about somebody showing up to the job and transcribing it perfectly, it's always going to be the same thing. And if you want to change it, it gets changed for everyone.

TP: Yes, so that's interesting. So I think it is fair to say that there is potential, and I'll come back to that with further questions. Ok, so moving on, I think we gave one example there of the coder software to do Java, doing encryption exercises in Java is one example.

Rodger: Yeah. That's pretty good stuff.

TP: Ok, then we talked about Google Drive, that, it's an interesting one, [you are] dissuaded from sharing code. Which is a fair point, I suppose students need to learn. It's always that balance between helping each other out, and learning from each other, but yet there is somebody who will just copy and paste somebody else's code. And do you think that is an inherent issue with the ease with which you can share code, or share files?

Rodger: I think it is a problem with the internet, not necessarily sharing because you can Google a code snippet of this. You can script of that, it is there, it is out there. You can take anyone's available stuff. This is why you see on a lot of forums, on famous programming forums such as Stack Overflow, you ask a question, they are not going to give you the code. There's no benefit in that, they know that there's no benefit. They will kind of push you to the solution. So again, I think that is more of an engineer mindset – they try and instil it into someone early on in college, so you will carry it into later life, because you are not helping, you are preventing.

TP: So you are not helping, you are preventing? That's a nice way of putting it. So we moved on then to talk about the subjects, the Engineering in Society, isn't that correct?

Rodger: Em, say that again?

TP: The Engineer in Society, is that a subject? Is that one you do with [lecturer]?

Rodger: Yes, that's one I do with [lecturer].

TP: It is called that, though? The Engineer in Society?

Rodger: It is, yeah.

TP: And in it, you are doing a kind of business plan?

Rodger: Uh-huh.

TP: And again, I have some notes here, you did some basic spot-fixing of the business plan [on the tablet] as opposed to any large-scale editing, that is typically done on the laptop?

Rodger: Yeah.

TP: So then we moved on to the general YouTube, looking at tutorials on YouTube, isn't that correct?

Rodger: Yip.

TP: I think you mentioned your final year project is on speech recognition, is that right?

Rodger: Mmmm

TP: It's 3D graphics, is that right? It's AR [Augmented Reality] or VR [Virtual Reality]?

Rodger: Emm….

TP: …but the core elements really is the speech element?

Rodger: The speech. I'm sort of messing around with everything at the moment. I've done it with 3D twice now, so I have to do several different elements of the software. I sort of communicate the versatility of the software…

TP: Yeah…

Rodger: And at the moment now, I am doing, like, I'm doing a VR one. It's going to be a simple, mini-game, that uses speech maths and stuff. It's just handy to have the tab there, because when I am sitting at home in bed, or something like that, I can be looking up ideas.

TP: Yeah.

Rodger: That's one of the big blockers for me. I'm not an ideas guy.

TP: You are a doer?

Rodger: Yeah.

TP: You are a problem solver?

Rodger: Mmmmm

TP: Right. And so the tab is giving you these ideas? You are looking around for inspiration from other games, potentially? Or other projects, is it or what?

Rodger: Yeah, it's just in general. You would never know when you see something and you think " Oh, there's an idea". I mean, one of the most famous early apps ever created was Paper Toss. And that came from a developer who was sitting in his office and trying to come up with a mini-game, was doing some sketches and got annoyed and went … [gestures throwing]. And his friends fan happen to blow it away from the thing. So then it became a game, and it was gigantic, huge.

TP: Very good. So ideas like that then, so that would be where you would search for that…. Ok. We talked briefly about Moodle, again, standard stuff, looking for notes, grades, some docs. Occasionally you use Moodle for a bit of messaging?

Rodger: Em…

TP: Or maybe the lecturer does it?

Rodger: It depends on the lecturer. It tends not to be… the way Outlook has been updated in the college in the last few years, it's become far more preferential to use direct email.

TP: Yes.

Rodger: Em, because you are minimising the clicks. I mean, if I send you a message on Moodle, you get an email to say….

TP: ….look at Moodle…

Rodger: Yeah, there's no point. Streamlining the process. Apart from newsfeeds, news updates, if a class is to be cancelled, that would be the only time Moodle would be used. Other than that … sometimes we get feedback, which is nice.

TP: Yeah.

Rodger: [lecturer] uses that, actually. Apart from that, that function in Moodle just isn't … the college has found a perfectly viable alternative to that problem.

TP: Why would you reinvent the wheel, I suppose?

Rodger: Exactly.

TP: Ok, moving on then to taking notes, you mentioned there were two things – opening Powerpoint files and annotating them, versus taking stuff down from the whiteboard and Evernote. Would you use Evernote much?

Rodger: I use it a fair amount, yeah. I tend to write lists of things. Like, as I have mentioned before, I am very much the kind of person that tries to minimise the amount of my brain power that is taken up by source information.

TP: You are effectively using technology, maybe?

Rodger: Yeah. I used to carry a notebook around with me and I'd have lists and lists and lists of albums to listen to, or things like that. So when I'd get the time, I'd just flip it open and just list. But Evernote has replaced that, just because it is quite good.

TP: So it's lists of to-do stuff, is it?

Rodger: Eh, yeah. To-do stuff, pretty much everything. Things I have to do, I don't really use it for reminders anymore, since I started integrating Google Calendar. But, em, stuff like… this is what I have to do, this is what I have done. Or if I have a solidly good idea, you know, which is very rare these days. But, eh, if I get something like that, I'd have whole lists of different categories of types of ideas that I have, I'd just write them all down.

TP: Ok, and as you said, that is for all intends and purposes, replacing your physical notebook?

Rodger: Yeah, it means I don't have to carry it around. And it synchronises with everything, so it is perfect.

TP: So you can open it on your phone, your tab, your pc, or whatever else you are at.

Rodger: And the main reason is that Evernote has a screenshot function in it, which is much, much better.

TP: Ok. And it's getting better. I started using Evernote three- or four years ago, and it's gotten much better.

Rodger: Yeah, it's been getting much, much nicer.

TP: Alright, em, I then turned to questions around the camera, and one or two things came out, really. Taking photographs of code, particularly if it is on the projector, is that correct?

Rodger: Yeah.

TP: And then you said you might take a 30-second or less video just for your own … if something is going too fast, maybe, or just general?

Rodger: Yeah, basically if somebody is doing a quick scroll, or something. The videos are few and far between, I might have taken a handful in my entire college life, you know?

TP: yeah.

Rodger: But it is handy enough to have. One of the ones I was doing more often that that, was taking a quick video of me explaining a concept to a friend of mine.

TP: Right.

Rodger: And then I can send him the video file.

TP: And was that for your benefit, his benefit, or both?

Rodger: Well, both. He is doing the same thing back.

TP: Ok, that's interesting. And would that also fall into the "few and far between"?

Rodger: Yeah, it wouldn't be very common. Like, the more you go on in our course, the more individual your projects become. So the less… it's not even that sharing is an option, there's just nothing to share.

TP: That's fair enough. So back then, to the top three apps – YouTube, Reddit and Chrome browser. Favourite features, then, we came to convenience and speed. I think convenience is the big one, probably, and I think we mentioned the ergonomics here somewhere. So when I say convenience, I suppose, I mean the physical convenience, the speed with which it turns on, that kind of stuff. Is that right?

Rodger: Yeah.

TP: As opposed to the laptop, where you are waiting for it to boot up, you have to log in, and whatever?

Rodger: It's not just that, though, it is the fact that I can rely on the tab to have … it's standby, for example, you can leave it in standby for days. It's fine. I almost never turn mine off, I just clip it, lock it, and it's fine. And I would be using it a fair amount, but I probably would only charge it every three or four days.

TP: Wow.

Rodger: That just shows the battery is there to be used. I also have my … I have a full battery bank.

TP: yeah.

Rodger: that can get me two full charges of it as well.

TP: Really?

Rodger: Yeah.

TP: It must be a big enough one, is it?

Rodger: It's 20,000 milliwatt hours, or something like that. It's basically five charges of this [the tab] for two charges of that [power pack].

TP: So that's a big deal as well, I suppose, the battery life. That falls, I suppose, under convenience, as well as the physical ergonomics.

Rodger: Even the shortcomings as well, people would say that if you do get stuck with a battery, I've found a solution around that. If I have my battery bank with me, it's not a problem.

TP: Sorted.

Rodger: Yeah.

TP: And when I flipped it over, you said your least favourite was the ergonomics around the button, it's too easy to accidentally hit the button. That's part of what we talked about, it's really a learning curve really, where you place your finger, you learn quickly.

Rodger: It's not only that, actually. My house mater has been so impressed by this thing that she went out and bought one two days ago.

TP: Seriously?

Rodger: Yeah, she went out and bought one. She got herself a cover from [named electrical retailer] – it's much better than the one I have been using. And one of the ways it does it, you know the way a lot of phone protectors, they have these raised bevels?

TP: Yes.

Rodger: …so if you put it down on the table, it doesn't scratch through. She has that. That basically raises your thumb and your palm, off the back.

TP: Oh, ok, so it's not…

Rodger: …and I was messing around with it and trying to force it. But it wasn't working, so I think I'll be taking a trip up this evening.

TP: Ok, so that's that problem sorted.

Rodger: Yeah, it's one of those things that I am finding that all of the issues and problems that I am having, are all having low-cost, easy fixes.

TP: yeah.

Rodger: You can get something to fix it. You can find a solution around it.

TP: And does that increase the utility, then? Does that increase the usefulness of it? Now that you see a small, quick fix to this particular issue, for example, that increases your utility?

Rodger: Oh yeah, sure. It's the same sort of problem solving, if you have a laptop and you have software where you have to have a scrollwheel or something like that, or if it is a little mouse-button in general, you are going to have to buy a mouse. Most people do. And they don't look at that as "Oh, it's a fault". It's not, it's just the way it is.

TP: Ok, interesting. So the next one, on general comms, you use Facebook Messenger, there's a class … I've said page here, is there a class page, probably for Facebook?

Rodger: Yeah, we have a group page.

TP: A group page, fair enough, yeah. So general stuff again, sharing, report writing, sharing links, code. So that is, as you said, a bit like a discussion, really, as opposed to "I found this, I found that"? So it's like general, comms?

Rodger: It's anything that is relevant to the course is posted there. If anyone is having any issues and needs… if anyone is really critically needing help, we have our own sort of community, shall we say.

TP: yeah.

Rodger: A news forum for suggestions, things like that.

TP: yeah.

Rodger: Because a lot of our stuff is self-directed learning. Recently, we had an animation project, for example. And one of the things we were emphasised to use were third-party software.

TP: right.

Rodger: And you are freely open to use whatever you want. So the lads were having issues with this, they had never done 3D before, so a couple of the boys posted up "here get this, it's free, it's not very well known, but it is fantastic, it'll take care of a lot of stuff for you, job done". That kind of quick access help. And of course having that in your bag, or your pocket is brilliant.

TP: Yeah. So I suppose community would be one way I would put there. Em, reading, one time it worked out?

Rodger: Reading, one time it worked out?

TP: I have no idea what that is about, I'll listen back over it to see. So then, the broader em, headphones is one area I was looking at with everybody as well, plug it in to the 3.5mm jack, podcasts, you listen to a bit everything the odd time, and maybe streaming music. I wanted to ask about that, I don't know if I covered it, is that your kind of … you put on the earphones, it's your time? Don't come near me, I am busy, is that it?

Rodger: Yeah, I tend to be the kind of person that if I am sitting down to do something … it depends. If I am sitting down to do anything kind of work related or studying, or just something I need to focus on, that's very much I do not want to be disturbed. And putting earphones in is a great way of doing that because especially if I am just sitting in the canteen, I do not deal well with background noise.

TP: Right.

Rodger: I find it quite distracting. So it's quite nice to stick in that, and throw on like some music, sometimes I throw on a light podcast, or something.

TP: Yeah. Something in the background, but more to drown out the background noise here? The kind of way I picture it is your "Do not disturb" sign, kind of "I am busy"?

Rodger: I think it is just the whole, sort of the theory that if you give somebody rhythm, like a consistent thing, like soft tones, ASMR, I think, there is talk of this.

TP: Right.

Rodger: You have like an hour and a half of this, and it's basically some nice sounds. But it's consistent. That's the whole point. There's nothing about it where there are any surprises.

TP: Like somebody dropping a fork or a cup, or something like that? [????]

Rodger: So you can just … white noise is the same.

TP: yeah. Ok, and we finally talked about the calendar, then. Anything about college, personal stuff, your calendar, your reminders, all of that is in there. I think I have here that you set reminders for two days in advance. I do the exact same myself, even three days, sometimes. And that's for, well, pretty much anything that needs attention or reminders, or anything else, projects, things like that. Right, so that's the recap, very quickly…

Rodger: There was actually one other thing…

TP: …sure, yeah.

Rodger: …that I really came up with yesterday.

TP: Yeah?

Rodger: Was that em, there's always a problem that I sort of noticed, when it came to handwriting.

TP: Yeah.

Rodger: and I imagine the lecturers have the worst problem, when you are reading through 150 different sets of handwriting. You know, your ability to read some it can become quite skewed.

TP: Yeah.

Rodger: you know, you have problems and things like that. So like yesterday, for example, I was having an issue with one of the projects I was doing. And my handwriting is God-awful because I don't practice at all. I almost never write things down anymore, I just type everything.

TP: Yeah.

Rodger: it's just the way things are. And one of the problems I used to have was that my handwriting was bad, so if I was writing code down on a page, it would be all over the place. So I would never go up to a lecturer, because they would have to spend two minutes going "What?"

TP: What four-year-old wrote this?

Rodger: "what is this?" You know, even if you had two of the same lines, they wouldn't look the same. But I was able to bring up on Decoder [software] I was able to import a file, that I've written, and it's not working, but I don't really understand why it's not working, what am I missing?

TP: Ok

Rodger: that sort of thing. And on the tab, I was able to go "ching, ching ching" and he looked at it immediately, and went "Ah, there's the problem there" and "Oh, try this." And I went pop, compile, and I was like "brilliant". And he goes "there's an error there." But it's only because it is on this, and not in your project file or folders, so I brought it home, put it in, and happy days.

TP: Ok, so what you are saying is that if you are working on something and you were to hand write it and say "look, give me help with that" they couldn't read it, because of handwriting, no more than myself?

Rodger: Mmmm

TP: Whereas, in this case, a brilliant example, you brought the code into the tab and said "look, this is what I am doing." So he could spot it much, much easier, is it?

Rodger: Yeah. Because previous to this, what I would have been forced to do was send an email. And then I am predicated on whenever they check their email, or anything like this, whatever. But at that point, I was able to get immediate, quick feedback, and it wasn't a trouble to anyone.

TP: Yeah.

Rodger: It's just a small thing, but it's something that just pinged in my head.

TP: [writing] So that's a good example where the technology of the tab trumps handwriting on paper. Great. Cool. Ok, here's a few questions, some of these are broad, some of them are a bit abstract, a bit fluffy, but sure let's go with it anyway. If you could design the ideal device, what features would it have?

Rodger: Em, I suppose if you were eliminating money, I suppose…

TP: …yeah…

Rodger: Well, form factor, starting off. I think Microsoft are on a winner with the Surface. It's definitely… it's getting there.

TP: yeah.

Rodger: the first generation was a solid start, but where they have gone now with the third and fourth it's really starting to iron out it's place. From just walking around, you are starting to see people using it.

TP: I've one, yeah.

Rodger: This is it. It is really … it is a solid piece of kit. It's almost like it is not new technology.

TP: Yeah.

Rodger: Because it uses Windows. It's got that platform, it's got that thing. It's got such an amount of open stuff to it. It works for the same reason I like Android, which is that you can tailor it to you. Not like with an Apple device.

TP: Yeah.

Rodger: Where what you get is what you get, and if you try and change that, well no. You get in trouble. So the Surface kind fixes it for me in a lot of ways.

TP: So it is, as you say, a combination of the form factor, the physical ergonomics that we are back to, that is brilliant, the wide variety of software that is available, and the customisation, the fact that you can, as you say, set it up as you want.

Rodger: Yeah, I think it is great that you can tailor it to your whole experience. That's sort of the ideal device for that, it has a solid camera in it, good microphone for communication and things like this. And maybe just a slightly better keyboard, and that would be for me, the perfect sort of thing. Ultrabooks, again, come into this, sort of, line of thinking.

TP: yeah.

Rodger: They are small, they are good, they can be powerful enough.

TP: Yeah.

Rodger: And that's pretty much it, then. I just like something with a solidly-sized screen, things like that. As a tablet, that's what you want – good performance.

TP: Performance, I suppose is a big one, isn't it? The responsiveness?

Rodger: Well yeah, performance is really the selling point of a tablet, I think. You know, it's tap, tap, tap, you are there where you need to be. There's no wait times, there are no loading times, there's no boot time. You know, this sort of thing? Very quick.

TP: It's there. So accessibility, in certain respects, it's there, it's instantly….

Rodger: And I suppose if I could throw something in, eye-tracking would be another good one.

TP: I have it on the Yoga, and it's rubbish.

Rodger: Yeah, but good eye-tracking.

TP: Good eye-tracking!

Rodger: I've had good eye-tracking, I have tested it out before. Good God, I cannot think of the name of it. But it's pretty spot-on.

TP: Yeah, this is the Lenovo Yoga 3, it has that. You know, you can wave, and if you are looking… I just gave up on it. That's an interesting one, I suppose for reading, primarily? If you are looking to the bottom of it, is that it? The bottom of a load of code, or a PDF? Is that it? Or what?

Rodger: Em…

TP: Or security?

Rodger: Well, no, security is one thing. But yeah, mainly for reading and stuff. I find myself using a huge amount of … specifically with the tab, because of the fact that it auto- … because most of the time, you are not moving sideways on a page, it is very much up and down.

TP: yeah.

Rodger: And that is where an eye-tracking system can be used quite effectively. Because if I am sitting at my laptop, typing away, and I can just kind of look down…

TP: …and it goes down. Oh yeah. Ok. We kind of touched on this next one earlier, do you think the institute could do more to facilitate the use of tabs?

Rodger: Em… I think so. I think just mobile devices.

TP: Ok, so not necessarily tabs?

Rodger: Because you know, we are talking about the same OSs [Operating Systems], the same things like that.

TP: What do you think they could do?

Rodger: I definitely think there has to be some sort of AIT app that is created, that is not utter crap, that is not, you know, clunky. This is the kind of thing that, the college almost has this sort of … how can I put it .. a sort of cockiness in a way, that they are very about "Oh look, one of our own designed this". And you know, "Look at this" and "use this". I mean, recently I got an email about student timetable app, or something. Now, it was made by a student, it works. It's functional, there's nothing functionally incorrect about it. But it is ugly as sin, and I probably opened it once and went "never again". It's not happening. It's the college's site, as clunky and weird-looking as it is, it's still preferable. And I'm just going to bookmark the timetable anyway.

TP: Ok… sorry, go on…so an app?

Rodger: Yeah, you need an app. One of the things I've constantly said is that anyone over in Engineering that does a full time course, a lot of hours in the day, never comes in to the canteen.

TP: Same with the staff. I rarely see the Engineering staff.

Rodger: Yeah, it just doesn't happen. There is a huge disconnect between them. But if you had some sort of newsfeed thing that isn't Facebook…

TP: yeah.

Rodger: …because people don't want to be subscribing to a Facebook thing.

TP: yeah.

Rodger: …cluttering their newsfeed, they are just not going to get it. Seeing [named head of Student Union] walking around the college, you know, three or four times a day, looking like he is on a Christian Rock album, or something [?]. I mean, the guy is doing good work, but I'm not interested in that. I want to see if there is something fun going on, or something interesting, or if Vodafone show up. One of the big ones was when Grad Ireland came along, you know? There were people I was talking to that had no idea. They just hadn't checked their email that morning, or the night before.

TP: Ok, so I suppose a newsfeed, what's on, build up a community, keep people informed as well as the timetabling and all of that kind of good stuff?

Rodger: Yeah.

TP: So all encompassing?

Rodger: Yeah. I mean, it seemed to me like a huge lost opportunity, the fact that the website has just been modernised, let's say.

TP: let's go with that.

Rodger: We found two bugs in it yesterday.

TP: I found one the other day when I was doing a search, there was a table in the database that was only handling IPV4 addresses, it wouldn't handle 6. I mean, rookie stuff.

Rodger: But sure one of the lads couldn't sign into his email, so he was "Are you guys having trouble with your email?" So then he went "watch." And he went through the current students [link], the entire way, all of the multiple links, didn't use the Quicklinks, to go to staff and student email, clicked it and it just went, no. It just doesn't work. And he thought it was broken because he didn't use the right link.

TP: Yeah. Let's not mention the war.

Rodger: I mean, there's a perfect example. They could've designed a far, far better application to handle this.

TP: Yeah, so I suppose it's a broader technology, I suppose the website is one example, focus of the institution. That if they want to encourage students, if they want to enhance the experience, this is one area that you think they could look at. It's the broader technology, a quality app and a proper website?

Rodger: It's about separating technology as well. Because the website is far too big, there is far too much stuff in it, this is the problem. I don't want … I wouldn't want to be the one designing it, you are looking at a book of requirements, not a couple of pages. There's just too much information there that is there. You are talking about students that are possibly coming to the college in first year, advertising, foreign student applications, and all this, staff contact and details for every single lecturer, these are things that don't need to be front and center. They can be separate. They can be if you are in the institution, this is where it is, this is the information that you need. And you don't want your office email and phone number publicly available.

TP: No, I really don't.

Rodger: But it is. And these are just concerns.

TP: Right. So that's interesting – it is an information and utilisation thing as well. I'm nearly finished up, are you under pressure?

Rodger: No, I am not.

TP: This is the one that trips a lot of students up – what do you think it means to be a student who uses a tablet device at a third level college? What do you think it means to be a student that uses technology like that?

Rodger: I think it's the classic case of, if there is technology there that can be used and improved, don't be afraid to take it on. Em, adoption is always… user adoption, is always going to be a barrier to any tech taking off.

TP: Yeah.

Rodger: But if it works for you, that's all that really matters at the end of the day.

TP: Right, so find the technology that works for you? Find the tool that works for you?

Rodger: Mmmm. I think that as long as there are not barriers involved in doing it, people will use it. I always say that students are always some of the best testers of products that you find, because they are some of the most lazy people that you will ever come across. And because of that, that means that no matter what, they will do the easiest possible thing to do. Which is a fantastic, reliable thing you can test for. So if you give people something and it is in any way clunky, they are not going to use it.

TP: They are going to switch off.

Rodger: And they will never go back to it. You know, they are very cool in that way.

TP: Ok, that's a fascinating one. So, don't be afraid of technology, the user-adoption and find a tool that works for you. Just to finish up then, probably a silly question for somebody like yourself who is studying technology, but do you think you will continue using technology after you graduate?

Rodger: Oh yeah.

TP: Yeah. And what part do you think it will play in your life in the workplace, do you think?

Rodger: I think just having a solidly good communication device, it's quite handy having that thing around with me, I can have stuff on it if is necessary for work, I can go to meetings, things like that. It's just here. I can Bluetooth into projectors and things like that. I don't have to drag a laptop around with me. Which is always nice. It means that if I am wearing a suit, I don't have to wear a backpack, I can just have a small bag, or something. Or even a case, and just throw that into it. It's smaller, it's handier. It's a lot more discreet as well, which is quite nice.

TP: I suppose with the smaller ones, or the bigger phones, the smaller tabs, call it whatever you will…

Rodger: The phablets.

TP: Phablets, that's right. Yeah, that's pretty much it. Ok. Anything else before I switch off?

Rodger: No.

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