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Secondary school students' technology practices in their everyday lives and at school

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SECONDARY SCHOOL STUDENTS' TECHNOLOGY PRACTICES IN THEIR EVERYDAY LIVES AND AT SCHOOL

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DEDICATION

In loving memory of my father Graham John McKeowen, without whose inspiration I would have never conceived it possible to embark upon, let alone accomplish, such an endeavour.

DECLARATION

I, Karley Alice Beckman, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Education, Faculty of Social Sciences, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged (Appendix A). This document has not been submitted for qualifications at any other academic institution.

Karley Beckman
September, 2015

ABSTRACT

Schools have a role to play in preparing students for their digital futures, but need to do more to cater for all students. Despite significant government investment and increased prominence in educational curriculums worldwide, there is a lack of conclusive evidence to demonstrate that technology has had a significant impact on student learning. Despite its use in schools, research suggests that disparities in the technology practices, skills and knowledge of school students still exists. In fact, there is much that is not fully understood about students' experiences with technologies, specifically how and why they use technologies in particular contexts. In order to effectively integrate technologies in secondary schools to benefit all students' learning and future opportunities, there is a pressing need for evidence-based practice.

This study extends educational technology research into secondary school students' technology practices by investigating how and why students use technology at school and in their everyday lives. Guided by the sociological framework of Bourdieu's theory of practice, the study design considers not only technology use but also context to provide an understanding of the interrelations between technology practices, the students and their surroundings. The multiple embedded case study reported in this thesis comprised four class cases and 12 student cases from two Australian public secondary schools. Student questionnaires and teacher interviews were conducted with 64 Year 9 and Year 10 students and four teachers from the class cases. From these class cases, 12 student cases provided in-depth accounts of students' technology practices through interviews and diary records. In reviewing the study findings and literature, this thesis presents a theoretical framework that conceptualises student technology practices. Data analysis was guided, first, by the emergent themes and patterns from the data and, second, by the theoretical framework.

The study found that students tended to use technologies in similar ways each day and often used only basic functions of the technologies both in their everyday lives and at school. Still, their technology practices were personalised, thus displaying varied technological dispositions, skills and knowledge. Students' varied experiences and dispositions towards technology practices were shaped by a multitude of factors,

including context, past experiences, skills and knowledge and others' technology practices and perspectives. Students were most likely to engage in technology practices based on their personal interests, which they deemed to be familiar, likely to achieve success or symbolically profitable in some way. These influences suggest that technology practices are innately a social practice that is most effectively studied with consideration of context.

The results suggest that students' technology practices are social and complex, in that they are shaped by and connected to the contexts in which they are used. This has practical implications for the use of technologies in formal education as students' traverse across contexts, negotiating each context's varying systems, structures and technology practices. Thus, an understanding of students' technology practices in their everyday life contexts inform understanding of how students perceive, approach and engage with technology practices at school. The outcomes of this study suggest that schools have the potential to shape students' skills and knowledge, and to expose them to a technological culture that may benefit student learning and future opportunities. This may be achieved through an understanding of students' practices and their contexts of technology use, thus informing the integration of technology applications that may be different from their everyday practices. This calls for a research agenda that examines not only students' practices with technology but also students' everyday life and school contexts of technology use, providing insight into the physical, social and cultural systems and structures that shape students' technology practices.

The outcomes of this research address a significant gap in contemporary understanding of the social and complex nature of students' technology practices. This is achieved through theorising technology practices using Bourdieu's theoretical constructs, thus contributing to the theory and empirical understanding of student technology practices, and so providing a conceptual framework of technology practice that may inform future research. The findings from this research provide a more holistic understanding of students' technology practices in their everyday lives and at school, and sheds light on the reasons that underlie their practices.

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CANDIDATE'S STATEMENT ABOUT THE STYLE OF THESIS

This thesis is submitted as a *thesis by compilation*. It includes one published journal article, five in-preparation journal articles prepared for future submission and three conventional thesis chapters. A synopsis explaining the purpose and content of each chapter is provided in the introduction chapter. The target journals for publication of the manuscripts are identified. These peer-reviewed journals have been selected because they publish articles that promote knowledge sharing in the areas of educational technology and contemporary issues relating to technology, society and learning, which are aptly suited for the content of this thesis.

The *thesis by compilation* format was chosen to present this research on the advice of my supervisors for two reasons. First, this approach allowed me to develop an understanding of journal manuscript preparation during the period of my doctorate. This has given me the opportunity to work intensively on multiple papers under close guidance from my supervisors, both of whom have significant publishing experience. This has been invaluable to my development as a researcher. Second, having these papers in an advanced state of preparation will enable me to contribute to the rapidly developing literature in educational technology in a timely fashion.

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CHAPTER ONE

Introduction

Foreword

This study aimed to extend educational technology research that describes students' practices, to investigate how and why secondary school students use technology in their everyday lives and at school. To do this the study considered three research questions:

1. What are the characteristics of students' technology practices in their everyday lives and at school?
2. How do contextual factors influence students' technology practices?
3. Why do students use technologies?

This chapter provides an introduction to the field of study, outlines the study's purpose and significance and states the research questions that guided the inquiry. It outlines the research context and research strategy and defines the key terms used throughout the thesis. Finally, as this thesis is presented in a *thesis by compilation* format, this chapter outlines the combination of conventional chapters and journal articles and gives an overview of the thesis chapters.

1.1 Introduction

Technology is becoming ever more ubiquitous throughout society. Part of this technological infiltration has seen large-scale technology investments in education in developed nations (Organisation for Economic Co-operation and Development [OECD], 2010). Technological initiatives, such as laptops for every student and internet connectivity, are being witnessed on a global scale, with the aim of enhancing educational achievement and providing students with technology skills (OECD, 2013). However, despite significant funding and initiatives, there is little evidence to demonstrate that technology has revolutionised education as anticipated, or that it has had any significant impact on students' learning (OECD, 2010; Shaw, Bourke, Holmes, Preston, & Smith, 2013). Despite significant research in the field of educational technology, there is still much that is not fully understood about students' experiences with technology in their everyday lives or at school.

This study adopts an exploratory approach to the investigation of students' technology practices. The study uses a multiple embedded case study design to investigate students' accounts of their technology practices in their everyday lives and at school. Multiple data sources including a questionnaire, interviews and diary records allowed the study to detail the practices of the secondary school student participants. Guided by the sociological framework of Bourdieu's theory of practice (1977), the study design considered not just students' practices but also the interrelations between technology practices, the students and their surroundings.

1.2 Background

Governments around the world recognise the penetration of technology in society, and thus the need to prepare students to successfully participate in an increasingly digital society and their working futures (Ministerial Council on Education Employment Training and Youth Affairs [MCEETYA], 2008; OECD, 2013). Education has a role to play in preparing students; thus, governments have heavily invested in technology based education innovations. Most recently many countries have aimed to universalise technology access in schools through access to computers and internet connectivity, and by investing in the production and provision of digital learning resources (OECD, 2010). These substantial government investments have occurred on a global scale with a focus

on infrastructure developments, such as resourcing schools with computers and other technology tools (Blikstad-Balas, 2012; OECD, 2010). Developed nations have extended efforts to reduce computer-to-student ratios and provide high-speed broadband connections to all schools (iN2015 Education and Learning Sub-Committee, 2006; New Zealand Ministry of Education, 2013). In recognition that access does not necessarily equate to use, focus has been placed on supporting technology integration. This includes embedding technology skills and knowledge in the curriculum, delivering technology related training for educators and providing access to high-quality digital resources for teachers and students through online repositories (Digital Education Advisory Group, 2013; US Department of Education, 2010). These patterns of investment around the world indicate the increasing prominence of technology in all aspects of society. This also means an increasing need for students to develop technological skills and knowledge to participate and succeed in their digital learning and future working lives.

Australian government policy emphasises the need for young people to become confident and creative users of information technologies, both in preparation for the contemporary working world and to become active participants in society (Australian Curriculum Assessment and Reporting Authority [ACARA], 2013c; MCEETYA, 2008). Part of this agenda saw the Australian Commonwealth government introduce the *Digital Education Revolution* in 2008. This five-year initiative (2008-2012) involved the *National Secondary School Computer Fund*, which provided a specialised wireless laptop to every student in Years 9 to 12 (New South Wales Department of Education and Communities [NSW DEC], 2012). These laptops were compact in size, featuring a range of software and large memory capacity, and were wireless-enabled with built-in security, specialised for educational use. Additionally, the Australian government invested in increased connectivity through wired and wireless networks in schools; digital teaching and learning resources, including online repositories; and teacher professional development. Coinciding with the conclusion of the *Digital Education Revolution* initiative was the development of the Australian National curriculum where technology has received increased prominence. In the Australian curriculum, implemented in Australian schools from 2014, technology is outlined as a general capability students must develop across all subject areas, as well as the introduction of technology specific subjects to be implemented from 2016 (ACARA, 2013b). State

governments have also initiated improvements to the digital tools available in schools, with the New South Wales government recently providing access to tools such as Google Apps and Microsoft Office 365 (NSW DEC, 2015). Appropriate school infrastructures provide the foundation necessary to help students “access, create and communicate information and ideas, solve problems and work collaboratively”, as outlined in the Information Communication and Technology (ICT) capability as part of the Australian national curriculum (ACARA, 2013c, p. 57).

The broad aims of infrastructure and educational investments are to provide opportunities for new and/or alternate skills, knowledge and ways of learning deemed necessary for contemporary society. However, government investments have not resulted in the revolution anticipated by such initiatives (OECD, 2010; Shaw, et al., 2013). Instead, the evidence suggests a more modest effect on practices and student learning outcomes. Specifically, empirical evidence indicates that technology integration in schools largely consists of routine uses of a narrow range of applications in relatively perfunctory ways (Charles, 2012; Dunleavy, Dexter, & Heinecke, 2007). Furthermore, low levels of technology integration in schools are associated with modest positive outcomes in technology skills and writing (OECD, 2013). These findings raise questions about the purposes for which technologies are used in schools. Do teachers and students share the same aims for technology use in school, or are their low levels of integration intentional? Overall, the evidence indicates that neither the reasons why technology is underused in schools nor the potential outcomes of technology use are fully understood.

Researchers argue that the potential outcomes of technology use in schools extend far beyond increased student achievement (Davies & Eynon, 2013; Inan, Lowther, Ross, & Strahl, 2010; Selwyn, 2012). Many of these potential outcomes are unexplored because many studies in the field of educational technology research are couched in a “cause and effect” philosophy. This leads to commentary and research questions that are overly simplistic, focusing on impacts rather than experiences or influences (Davies & Eynon, 2013). These ways of thinking are led by assumptions that technology affects learning outcomes, that effective technology practices are caused by certain factors or that students should display specific desired technology practices (Selwyn, 2012). However, a growing body of research suggests that technology practices are much more complex,

influenced by a range of contextual and individual aspects (Bennett, Maton, & Kervin, 2008; Selwyn, 2011a). Without a better understanding of school, teacher and student perspectives and practices it is unlikely that the expected learning outcomes can be achieved. More needs to be known about how students experience technologies, with consideration of contextual aspects to understand what technology skills, knowledge and dispositions they bring to their learning.

Current evidence that considers broader contextual influences on technology practices indicates that students' practices are not uniform (OECD, 2011; Eynon & Malmberg, 2011; Gurung & Rutledge, 2014; Selwyn, 2011a; Smith, Skrbis, & Western, 2013). Recent investigations of students' technology practices in school or home contexts and comparisons of students' technology practices across contexts demonstrate variations both within and across contexts (Eynon & Malmberg, 2011; Gurung & Rutledge, 2014; Persson, 2014). This discredits popular assumptions of technology savvy students characterised by their generation's immersion in a digital society (Prensky, 2001). Because students' technological skills, knowledge and practices are more complex than such generational notions suggest, the challenge for researchers is to understand variations in students' practices and consider what those mean for effective integration of technology in education. Specifically, a deeper understanding may inform technology integration in schools that extends students' range of digital experiences, is relevant to all students despite their backgrounds and doesn't assume that all students have particular skills, knowledge or inherent interest.

There is still much that is not understood about students' technology practices, despite research into the kinds of technologies and frequency of use at school and other contexts, including students' homes (Ellis, Goodyear, Bliuc, & Ellis, 2011; Inan, et al., 2010; Wang, Hsu, Campbell, Coster, & Longhurst, 2014). Specifically, there is a need for research that extends beyond descriptions of students' technology practices to explain *how* and *why* students use technologies (Selwyn, 2010). The study reported on in this thesis concerns itself with addressing this research need. The study addresses the gap in contemporary understanding by exploring students' technology practices through their perspective, and with consideration of the contexts in which their practices occur.

1.3 Significance

This research addresses a significant need for a contemporary understanding of students' technology practices. As technology becomes increasingly pervasive in today's society, students must be able to use, share, create and process information with technology to participate and succeed in a digital world (MCEETYA, 2008). However, a growing body of research suggests disparities in school students' technology practices, skills and knowledge (Calvani, Fini, Ranieri, & Picci, 2012; OECD, 2009; Smith, et al., 2013). Inequalities in digital practices, skills and knowledge affect students' use of technologies in their everyday lives and at school, and influence their learning and achievement in other areas of education (OECD, 2009). Furthermore, research suggests that the impact of digital inequalities may extend to other areas of young people's lives, involving social, cultural and economic factors that may ultimately shape students' life trajectories (Robinson et al., 2015).

Schools have a role to play in preparing students for their digital futures and bridging digital inequalities. However, research suggests that this is not occurring in most schools, and that schools need to do more to cater for all students (OECD, 2011). Specifically, empirical evidence suggests that technology integration in schools predominantly involves routine uses of relatively basic technology applications with modest positive outcomes for students (OECD, 2013). This is of concern, as failure to provide equal opportunities for students to develop technological skills and knowledge most likely perpetuates digital and other inequalities (van Deursen & van Dijk, 2011). At present it is not clear how this challenge should be addressed, due to a lack of empirical research that goes beyond descriptions of what and when students use technologies. To effectively integrate technology use in school to cater for all students there is a pressing need for evidence-based practice that explores broader individual and contextual factors that shape the varied and complex ways students engage with technologies (Robinson, et al., 2015). This research need is particularly significant at a time when governments and educational jurisdictions are making considerable investments in infrastructure and calls for technology practices that revolutionise teaching and learning.

This research is timely in the Australian context, where technology has received increased prominence in the Australian national curriculum for school students (ACARA, 2013c). The Australian curriculum outlines information and communication technologies (ICTs) as a general capability encompassing the knowledge, skills, behaviours and dispositions students require for success in today's society (ACARA, 2013c; MCEETYA, 2008). However, ICT capabilities are currently not routinely assessed in schools and there is little guidance for teachers to support students in meeting these outcomes. Also of concern is that the curriculum makes the assumption that students develop such capabilities both at school and in their everyday lives, and can transfer them "across environments and applications" (ACARA, 2013c, p. 57). This is significant, as assumptions such as this overlook emergent research that highlights variations in students' backgrounds, technology practices, skills and knowledge (Calvani, et al., 2012; OECD, 2009; Smith, et al., 2013).

An understanding of technology practice according to context, and the ways students traverse between contexts, is particularly relevant to the study of young people's technology practices. Secondary school students are distinct from other groups of students, such as primary or tertiary students. As young people's social networks expand throughout adolescence, so too do their contexts and practices (Davies & Eynon, 2013). This requires a distinct research approach that allows for the exploration of secondary students' technology practices across their lives, while being sensitive to necessary ethical considerations of conducting research with minors (Hopkins, 2013). Moreover, there is little current research that investigates secondary school students' technology practices with consideration of the varied contexts in which this group of learners engage with the technology.

The study is significant as it makes a contribution to advancing understanding of students' technology practices to address these research needs in its conceptualisation of the problem, the multiple embedded case study approach to data collection, the use of sociological theory to frame the investigation and its potential to inform policy. The study adopts a fresh conceptualisation of the problem of effective educational technology integration in schools. Specifically, this research extends beyond investigation of what technologies students use by exploring how and why secondary

school students use technologies according to context. This study focuses on students' technology practices as they traverse across contexts, for which the evidence is scarce (Calvani, et al., 2012; Sánchez, Salinas, Contreras, & Meyer, 2011; Smith, et al., 2013) and thereby adds important empirical data about the interrelations between context and technology practice. An understanding of how students use technologies according to context and the influence of individual and contextual factors will provide evidence that can inform technology integration in schools to better cater for all students.

To yield rich description and understanding of students' practices with consideration of the individual and the contexts in which they engage with technology, the study collected data from a number of overlapping sources through a multiple embedded case study approach. The collection of data from teachers and students using a questionnaire, interviews and diary records provided insights into the characteristics of students' specific technology practices and why young people choose to use particular technologies. Exploratory interview tools allowed for students to recount past and present digital experiences and discuss specific technology practices, which contributed to an exploration of the details, purposes of use and students' perspectives. The overlapping of data collection methods, such as interviews and diary records, provided further opportunities to deeply explore students' practices from their perspectives. Few studies have adopted such a range of methods to garner student perspectives of technology practices (Brown, 2012; Concole, de Laat, Dillon, & Darby, 2008). Thus, this study makes a methodological contribution to the way students' technology practices are investigated by adopting multiple overlapping data collection methods through the perspective of the student.

To make sense of the rich data produced by the study methods, this research used a sociological framing: the study theorises technology practices using Bourdieu's theoretical constructs (1977) to explore the individual and contextual factors that shape students' technology practices. The study employed Bourdieu's theory of practice in the overall design of the data collection, procedures and analysis. The embedded application of Bourdieu's theory of practice provided a rigorous way to investigate and understand student technology practices with consideration of the social and cultural influences within their contexts of use. This application of Bourdieu's theory of practice to study individuals as they traverse fields is an original contribution to the

field of educational technology, and to educational research more generally. The theoretical framework serves a tool to inform future research into students' technology practices; specifically, to guide the investigation of individual and contextual factors that shape technology practices.

The outcomes of this study inform practice and policy in secondary schools through a deeper understanding of students' technology practices according to context. A deeper understanding of students' backgrounds, practices, skills and knowledge with technologies, and of the underlying logic that shapes their practices, provides insights into how and why students engage in particular ways with technologies at school. Moreover, an understanding of students' technology practices in their everyday lives provides insights into how these practices may relate to school technology, as well as how school technology use may relate to everyday life contexts. These insights provide opportunities to better inform the implementation of the current ICT curriculum and inform technology integration approaches in secondary education to cater for all students and provide opportunities to extend students' range of digital experiences.

1.4 Research questions

The purpose of this study was to investigate secondary school students' technology practices, with consideration of the milieu in which these practices occur. Specifically, the study aimed to investigate how and why secondary school students use technology in their everyday lives and at school. To do this, the study considered three research questions:

1. What are the characteristics of students' technology practices in their everyday lives and at school?

To understand students' technology practices, first the descriptions and characteristics of their practices must be established. This question explores the details of students' practices according to context, including what technologies students use and how they use them.

2. How do contextual factors influence students' technology practices?

This question explores the circumstances that shape students' technology practices. Technology practices do not occur in isolation; instead, they are influenced by the context in which they occur. Thus, to adequately understand an individual's practices with technology, the structures, cultures, practices and relations that constitute technology use in a particular context must simultaneously be considered.

3. Why do students use technologies?

This question explores the underlying logic of students' technology practice. More specifically, it examines students' decisions to use or not use technologies, how they perceive and value technology, and the likelihood of future practices. An understanding of the reasons students use particular technologies may lead to future research approaches that further explore these details of use. Such evidence may also better inform educational policy, and ultimately teaching practice and student learning, by providing learning opportunities that consider student perspectives and are tailored to their learning needs.

1.5 Research strategy and context

The study adopted a qualitative multiple embedded case study design. Case study methods are a preferred approach when aiming to understand a phenomenon that cannot be controlled by the researcher and with consideration of contextual factors (Yin, 2009). A multiple embedded case study design allowed the researcher to explore the technology practices of students and teachers from four class cases (one Year 9 and one Year 10 class from each school), comprising 64 students and four teachers. From these class cases, three students per class were purposefully selected to comprise in-depth case studies to supplement the class case data. The study was conducted at two public secondary schools in a regional Australian city. At the commencement of the study, the participating schools and students were involved in the Australian Commonwealth government's one-to-one laptop initiative, meaning that each student participant had access to a specialised wireless laptop (NSW DEC, 2012).

To move beyond descriptions of practice and toward understanding, the study employed Bourdieu's theory of practice (Bourdieu, 1977). The sociological theory provided a

framework through which to understand students' technology practices. More specifically, the theoretical constructs of *field*, *habitus* and *capital* provided a lens through which to conceptualise the individual and contextual factors that shape students' technology practices. This conceptualisation in turn shaped the selection and design of the data collection methods, including the design of multiple embedded case study to design and multiple overlapping data methods to produce in-depth data; the emphasis on collecting data through the perspective of the student; and data collection methods that allowed for investigation of students' technology practices across their lives.

The research was conducted in two phases: Phase 1 collected data from students and teachers in the class cases, while Phase 2 collected data on the 12 student cases. The researcher assumed a collaborative research relationship with participants. The researcher disclosed the purpose and methods of the research, emphasising that the students and teachers were part of the research process: investigating *with* the researcher as opposed to the research being conducted *on* them (Corsaro, 2005). During the first phase of the study, students completed a questionnaire that surveyed their access to and uses of technology at school and in their everyday lives. The class teachers were also interviewed to establish insight into the practices and student technology use at school. Phase 2 comprised one-on-one interviews with each student case to explore themes from the questionnaire in more depth. Following this, students used a diary to record all technology practices over a two-week period. Finally, the practices recorded in the diary were used a stimulus for a final one-on-one interview. The data was analysed during and after data collection.

This research design was developed to yield rich data that described students' technology practices and, more importantly, illuminated the underlying logic of these practices. Key to the case study research design was the collection of data:

- from multiple data sources producing rich descriptions;
- considering contextual influences, including students' experiences, circumstances, beliefs and other field participants' technology practices at school and in their everyday lives; and
- from the perspective of the participant, allowing technology practices to be framed within students' lives.

Initial preliminary data analysis was conducted during data collection to inform case study sampling and subsequent data collection activities. At the conclusion of data collection, the data was inductively analysed through open coding to establish themes and patterns. Following this, a second line of selective coding was conducted by coding the data using conceptualisations from the guiding theoretical framework (Bourdieu, 1977). Within- and across-case analysis was then conducted, involving comparison of class cases, teacher cases and student cases to highlight patterns and disparities (Yin, 2009). Finally, the theoretical framework was reviewed in light of the study interpretations and conclusions.

1.6 Limitations

While the exploratory approach of the case study research design allows for in-depth investigation of phenomena, a number of limitations are associated with the approach (Yin, 2009). Specifically, the self-reported nature of the data collection methods poses risks that the data is a subjective, and likely incomplete, report of practice. To counter this, multiple overlapping data sources can overcome inconsistencies or omissions in the data (Stake, 2006; Yin, 2009). Additionally, the relatively small sample size of four class cases, comprising 64 students and their teachers, limits the generalisability of the findings. Though, it is acknowledged that this study serves to further understanding about how students use technologies, it does not attempt to make generalisations. Therefore, the findings of this study comprised of thick and in-depth descriptions of each case. The burden of generalisibilty then lies with the readers, who are assumed to be able to generalise subjectively from the case in hand to their own personal experiences (Stake, 2000).

1.7 Definitions

> The construction of a scientific object requires first and foremost a break with common sense, that is, with the representations shared by all, whether they be the mere commonplaces of ordinary existence or official representations, often inscribed in institutions and thus present in the objectivity of social organizations and in the mind of their participants. The preconstructed is everywhere. (Bourdieu & Wacquant, 1992, p. 235)

The preconstructed exists in researchers' choice of research topic, and thus their preconceived notions and attachment to it (Grenfell, 2009). Bourdieu constantly warned throughout his work to "beware of words" and the accumulated, value-laden nature of their social construction (Bourdieu & Wacquant, 1989, p. 54). In an attempt to liberate the research from the value-laden nature of socially constructed meanings, the researcher must attempt to reconstruct the object of research by first defining it, seeking to explain and understand it in its own terms (Grenfell, 1998). Though it may be impossible to be completely objective, the plight of the researcher is to be reflexive throughout the study to minimise the effect of subjectivity on the research.

The object of this study was to investigate student *technology practices*. In defining technology practices, the term *technology* will first be outlined. This study concerns itself with digital technologies, including:

- computing hardware/devices (e.g. desktop personal computers, laptop computers, tablet computers and interactive whiteboards),
- personal computing devices (e.g. smart phones, mobile phones, mp3 players),
- audio-visual devices (e.g. digital still and video cameras),
- games consoles and hand-held games machines,
- computer software (e.g. word processing, presentation and spreadsheet software) and
- online services (e.g. websites, email, web-based communication services) (Selwyn, 2011a).

However, technology does not exist, nor can it be used, without human involvement. Therefore, in line with the ontological foundations of the study, technology encompasses the artefact, practices and context (Lievrouw & Livingstone, 2002).

The term *technology practice* is used throughout the thesis. Technology practice is purposefully used in distinction from other common terminology such as technology use. Drawing on Bourdieu's notion of practice, technology practice is defined as more than the use of the technology, but also encompasses the social and cultural relations, systems and structures, and the meaning the practice has in the individual's life.

A number of terms are used throughout the thesis to refer to context, specifically *school* and *everyday life* contexts. These terms are defined in light of Bourdieu's concept of field. Field is a spatial metaphor referring to the social relations, systems and structures and the associated individuals who define a space (Bourdieu, 1990b). Therefore, *school* refers not to the physical space bounded by the school fence. Instead the school field is defined as the individuals who make up the field, including students and teachers, along with rules, policies and accepted practices. This sociological approach to the investigation of the school field of technology practice fits within with the broader field of sociology of education, that highlights the political, economic and cultural aspects of schools influencing "the way people think, live and work, their place in society and their chances of success or failure" (Sadovnik, 2007, p. xiii).

Everyday life is a term used to refer to fields and practices outside of the school field. The study of the everyday life has a long tradition in sociology and philosophy, being conceptualised by theorists to explore the mundane and familiar nature of the everyday and "highlight the central role it plays in the social world" (Gardiner, 2002, p. 2). The study of familiar or seemingly mundane aspects of an individual's lived experience underpins all human thought and practice. It has therefore been used to explore how and why individuals think and act within their wider societal structures. This thesis uses Bourdieu's theory of practice to conceptualise everyday life fields. Everyday life fields include students' homes, family and friends' homes and various other contexts outside of the school field. Like the school field, these everyday life fields are defined by the individuals who occupy them, along with rules, shared beliefs and accepted practices. In this study the conceptualisation of everyday life fields in this way allows for underlying structures of these fields to be explored and highlight the tensions that exist as individuals traverse between fields.

It is important to note that these fields of *school* and *everyday life* are not distinct boundaries – physically or temporally. Students engage in social and everyday life practices within the school field and school practices in their everyday life. And as individuals traverse between fields, they bring with them internalised rules, beliefs and accepted practices from other fields. For example, homework is a school practice most often conducted within students' homes; and while it is essentially a practice governed by the school field it is also subject to the practices of the home field, such as parental expectations about students' completion of homework and students' access resources within the home. Therefore, the consideration of education related practices in everyday life, such as homework, becomes an analytic distinction, shaped by the systems and structures of multiple fields, rather than belonging solely to either the school or everyday life field.

The terms "outside of school" and "everyday life" were used interchangeably throughout data collection, specifically in the questionnaire and interviews with students. The term "outside of school" was deemed to be less ambiguous for the student participants than "everyday life".

Additional to field, Bourdieu's concepts *habitus* and *capital* are also used throughout the thesis. To avoid being overly reductive, and consequently misleading, these terms are not presented in this list of definitions. Rather, these terms are defined in detail in Chapter Three and elaborated throughout the thesis.

1.8 Thesis structure

The thesis is presented in a *thesis by compilation* format comprising a combination of conventional thesis chapters and chapters written in journal article style. The six journal articles have been either published or prepared for submission to high-quality peer-reviewed journals. The purpose of presenting a thesis in this format is to provide the opportunity to develop my skills of journal article writing as part of the thesis preparation process, and to facilitate the timely publishing of the results from the study after the thesis has been completed. To ensure the cohesion of the thesis, the publications have been supplemented with three traditional chapters: Introduction, Methodology and Conclusion. Table 1 provides an overview of the chapters in this thesis and indicates the authorship and publication plan for each of the journal articles. This is followed by a synopsis of each chapter, outlining the publication status and location (for those presented as journal article format).

Table 1 Overview of chapters and journal articles

Chapter	*Title*	*Format*	*Location*	*Author contribution*
One	Introduction	Chapter	n/a	Karley Beckman
Two	Secondary school students' technology practices across their lives: A systematic literature review	In-preparation journal article	*Educational Research Review* IF 3.107 8500-word limit	Karley Beckman (90%); Sue Bennett* (5%); Lori Lockyer* (5%)
Three	Conceptualising educational technology in schools through a Bourdieuian sociology	In-preparation journal article	*Learning, Media and Technology* IF 0.958 8000-word limit	Karley Beckman (90%); Sue Bennett* (5%); Lori Lockyer* (5%)
Four	Methodology	Chapter	n/a	Karley Beckman
Five	Tech savvy students? What do students do with technology in their everyday lives and the implications for technology use in school	In-preparation journal article	*Australian Journal of Education* IF 0.243 6000-word limit	Karley Beckman (90%); Sue Bennett* (5%); Lori Lockyer* (5%)
Six	Examining the school field of technology practices	In-preparation journal article	*Computers & Education* IF 2.630 No word limit	Karley Beckman (90%); Sue Bennett* (5%); Lori Lockyer* (5%)
Seven	Understanding students' use and value of technology for learning	Published journal article	*Learning Media and Technology* IF 0.958 8000-word limit	Karley Beckman (90%); Sue Bennett* (5%); Lori Lockyer* (5%)
Eight	Exploring the transformative potential of young peoples' technology practices in school	In-preparation journal article	*British Journal of Educational Technology* IF 1.394 4000-word limit	Karley Beckman (90%); Sue Bennett* (5%); Lori Lockyer* (5%)
Nine	Conclusion	Chapter	n/a	Karley Beckman

Note: * Research supervisor

Chapter Two presents a systematic literature review that examines current research on secondary school students' uses of technology at school and in their everyday lives. The findings of this review demonstrate that students' practices are complex, but more importantly, there is much that is not understood about how and why students use technology. The paper concludes that students' technology practices in their everyday lives and at school are diverse and multifaceted, but generally narrow in scope. The paper recommends that research must move beyond localised descriptions and toward establishing a deeper understanding of students' technology practices through theorising the tools and practices that students use. The systematic literature review journal article was predominantly the work of the doctoral candidate. Specifically, the doctoral candidate designed the search strategy, conducted the search, performed the analysis and wrote the manuscript. The research supervisors provided guidance on the focus, style and structure of writing, as well as proofreading and critiquing various versions during writing. The article will be submitted for review in *Educational Research Review*. *Educational Research Review* was chosen as it specifically publishes review studies in education and targets a research audience at which this article is aimed. This article can make a relevant contribution to the journal, as the presence of technologies in education and society has changed significantly over the past decade, and this paper reviews the empirical research over this period to characterise how students use technologies in these contexts.

Chapter Three provides an introduction to the theoretical framework of the study. This paper introduces Bourdieu's theory of practice and explores its application in the field of educational technology in schools through a review of relevant literature. Bourdieu's theory of practice is proposed as an example of sociological theory that may be adopted in educational technology research to move towards understanding the wider complexities of technology practices. The paper presents a theoretical framework of student technology practices according to Bourdieu's theoretical constructs, field, habitus and capital, which underpin the study methodology. Chapter Three was mainly written by the doctoral candidate, with the guidance of the research supervisors. The focus of the article was a collaboration of all three authors' expertise in theoretical applications in educational technology. The doctoral candidate was responsible for the composition of the article, with feedback and editing contributions from the research supervisors. The article will be submitted for review in *Learning, Media and*

Technology. Publication of the paper in this journal would communicate Bourdieu's sociology and application to school students' technology practices to a specialist educational technology audience. Furthermore, the paper contributes to the current dialogue within the journal, focusing on its scope of social and cultural issues of technology use within society and educational contexts.

The methodology of the study is detailed in Chapter Four. This chapter is written in a conventional chapter format. While details of the methodology are distributed across the articles presented in Chapters Five through Eight, key details of the methodology could not be clearly communicated in the brief format of a journal article. Therefore, the purpose of this chapter is to explain the research methodology and highlight the interrelations between method and theory. The chapter presents the multiple embedded case study design. The research is framed by the paradigmatic orientation, the research design is presented and each phase of the study is outlined in detail. Finally, the chapter details the data analysis methods, procedures to ensure the integrity of the data and ethical considerations of the research.

The study findings are presented across four chapters (Chapters Five through Eight). Table 2 summarises the reporting of all data sources according to chapter. The table demonstrates that while each chapter may not present findings from the study in its entirety, the findings are presented throughout the thesis.

Table 2 Overview of presentation of data sources

	Data source	*Findings presented*
Phase 1	Student questionnaire	Chapter Five Chapter Six
	Teacher interview	Chapter Six
Phase 2	Student initial and final interviews	Chapter Five Chapter Seven Chapter Eight
	Technology diary	Chapter Five Chapter Seven Chapter Eight

Chapters Five and Six present findings from the study that centre upon the first research question – characterising students' technology practices in their everyday lives and at

school. Chapter Five reports on findings from the student data from Phases 1 and 2 of the study, including questionnaire data from 64 students within the four class cases; and interview and technology diary records from the 12 student cases. The findings depict students' technology practices as personalised, and characterised by generally routine and rudimentary practices. The findings presented in this article challenge claims about tech-savvy learners and consider the implications for learning with technologies at school. The doctoral candidate was the lead author of this manuscript, responsible for the focus, content and development of the article. The research supervisors critiqued the drafts of the chapter, providing feedback and editing contributions. The article will be submitted for review in the *Australian Journal of Education*, which focuses on research related to education and schooling, particularly by and for an Australian audience. The article has a practical focus, making it relevant for both researchers and educators. This journal was therefore selected for publication of this chapter, as it attracts an audience of educational researchers and educators interested in issues of contemporary concern in education.

Chapter Six is presented in journal article format, reporting on students' technology practices at school. This article situates students' practices within the school context, using Bourdieu's theory of practice to analyse and theorise the school field. The chapter presents the findings from Phase 1 of the study, specifically the questionnaire and interview data from the four class cases, comprising 64 students and their four teachers. This article was predominantly written by the doctoral candidate, who decided the article focus, style and content. The research supervisors critiqued the drafts of the chapter, providing suggestions at various stages of the writing. The paper has been prepared for submission for review in *Computers & Education.* This journal was targeted as it invites articles that deal with educational technology and social issues similar to those examined here. Moreover, this paper is well suited to the journal, as it contributes to the current conversation within it that calls for a more critical investigation of the systems and structures of schools and technology practices (see, for example, Belland, 2009; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012).

Chapters Seven and Eight present data from the student cases. The 12 student cases are presented in Chapter Seven. The paper presents data from Phase 2 of the study,

including interview and diary records of the 12 student case studies. The paper provides detailed accounts of students' experiences with technologies in various contexts, with consideration of the milieu in which technology use occurred, illustrating the heterogeneous and complex network of influencing factors on students' technology practices. Chapter Seven was mainly the work of the doctoral candidate. The role of the research supervisors in this paper was to critique the drafts of the chapter and provide suggestions about focus, content and style at various stages of the writing. This article has been published in *Learning, Media and Technology* and included as part of this thesis for examination with the approval of the publisher (Appendix B). This article was suited for this journal as it contained theoretical discussion of the empirical findings, which aligned with the journal's aim of addressing the relationships between education, technology and society.

Chapter Eight is in journal article format, presenting data from Phase of 2 of the study through three selected student case studies. To include sufficient richness within the confines of a journal format, this paper presents three selected student case studies presented in detail. The detailed accounts of these three cases demonstrate the reality and complexity of the students' technology practice. Additionally, the in-depth case studies demonstrate the depth of analysis using Bourdieu's theoretical constructs through detailed descriptions of students' technology practices using field, habitus and capital as a lens through which to understand students' practices with technology. This article was predominantly written by the doctoral candidate, who decided the article focus, style and content. The research supervisors critiqued the drafts of the chapter, providing suggestions at various stages of the writing. The article has been prepared for submission to the *British Journal of Educational Technology.* This journal invites papers detailing theories of educational technology. Therefore this paper is well placed to contribute to the current conversation proposing the application of Bourdieu's theory of practice in educational technology research (see, for example, Mills, 2008; Oliver, 2013) and contributes empirical evidence from younger students, who have been less extensively studied than older students (e.g. Czerniewicz & Brown, 2013).

Chapter Nine is a conventional thesis chapter that presents the conclusions drawn from the study. Chapter Nine presents and discusses the study's key findings and draws

conclusions through addressing the three research questions. The chapter also presents a discussion of implications for practice and research, limitations of the study and recommendations for further research.

In addition to the chapters and papers presented in the main thesis document, an additional peer-reviewed published conference paper is included as an appendix (Appendix C). This paper focuses on a single student case to provide rich descriptions of the student's technology practices, with consideration of his social contexts. The findings from this case demonstrate the various social contexts in which the student participates and how this influences his technology practices. This paper supplements the cases presented in Chapter Eight.

CHAPTER TWO

Secondary school students' technology practices across their lives: A systematic literature review

Foreword

This paper is prepared for publication as **Beckman, K.**, Bennett, S. & Lockyer. L. 'Secondary school students' technology practices across their lives: A systematic literature review' in *Educational Research Review*. The paper is presented as a systematic review that uses a systematic and reproducible method to appraise relevant empirical research (Booth, Papaioannou, & Sutton, 2012). Conducting a systematic review may enhance the clarity and internal validity of a literature review (Booth, et al., 2012). While a systematic review may not be an exhaustive review of the literature, the method clearly communicates a significant body of relevant research from various discipline areas to answer a specific question (Booth, et al., 2012). This method of review also reduces potential bias in the selection of literature to be included for review, thus enhancing the internal validity of the review and conclusions. A systematic review details the methods used, allowing for the review to be reproduced and audited.

The purpose of this paper as part of this thesis is to systematically review research that reports on secondary students' technology practices according to contexts in which they engage with technologies. While, the systematic review may omit a number of large-scales reports and relevant research of other groups of students (which are included in other chapters of the thesis), the systematic nature of the review focuses attention on

research that answers specific questions. The literature review serves to synthesise and analyse relevant research and demonstrate how the empirical findings relate to each other and, ultimately, contribute to an understanding of secondary students' technology practices. A discussion of these findings signals areas for future research. The review also serves to position this study within the existing literature.

2.1 Abstract

Research into the ways technology is used in secondary schools has generally focused on practical concerns related to teaching and learning, but has provided few insights into how students experience technologies at school and in their everyday lives. This represents a significant gap in an understanding of the role technology plays in an important developmental stage of a young person's life. This systematic literature review examines current research into secondary school students' uses of technology across contexts inside and outside school. The findings demonstrate that students' practices are complex, but more importantly, there is still much that is not understood about how and why students use technology. Specifically, we argue for research that moves beyond localised descriptions or deterministic conclusions and toward theorising technology practices. We suggest that a more comprehensive research agenda is needed to develop an understanding of the broader issues of young people's technology practices that can better inform research agendas, policy and practice for technology in education.

2.2 Introduction

The current generation of students has been distinguished by their immersion in a digital world, as their lives become increasingly pervaded by technologies at home and school and in the community (Davies & Eynon, 2013; Livingstone & Helsper, 2007). This has led to both celebration of and concerns about students' engagement with technologies and the potential effects on their learning (Bennett, et al., 2008). In turn, this has sparked much research aiming to characterise and understand young peoples' uses of technologies in this digital world.

The premise of much of the research investigating digital technologies and education has been founded on notions of a distinct generation of technology savvy students; the ubiquitous penetration of digital technologies throughout society; and the inherent effects of technology use on aspects of society and education. In response to claims about a distinct and homogenous generation of skilled students (Prensky, 2001), and the need for dramatically increased technology integration in schools, a number of studies have assessed students' competencies. Findings have indicated that the "kind of skills,

understandings, and critical reflections students are able to use" are highly varied (Hatlevik & Christophersen, 2013, p. 241). Further, students may be competent in basic procedural or technical skills, but often lack more critical skills and knowledge (Calvani, et al., 2012; Gui & Argentin, 2011; Kim & Lee, 2013; Kuhlemeier & Hemker, 2007; van Deursen & van Diepen, 2013). While these findings may inform teaching practice, they do not fully explain students' practices. Specifically, the competencies measured do not explain aspects of students' practices that would further understanding of the ways students use technologies and the reasons behind their technology choices.

In addition to student competencies, researchers have also sought to explore the impacts of technologies on students in schools (Hinostroza, Labbé, Brun, & Matamala, 2011; Muir-Herzig, 2004). This research includes potential improvements in student learning (Freiman, Beauchamp, Blain, Lirette-Pitre, & Fournier, 2010; Friedel, Bos, Lee, & Smith, 2013; Voogt, Knezek, Cox, Knezek, & Ten Brummelhuis, 2013) and development of technology related skills (Ilomäki & Rantanen, 2007). These studies' findings have demonstrated how specific technology practices can positively affect student learning. However, in general, the findings have led to more questions than answers, suggesting a complex array of contextual and social influences that require further investigation.

Largely missing from the extensive body of research on educational technology over the past two decades has been a crucial line of inquiry into students' practices with technologies. Specifically, there is a lack of empirical evidence detailing what students actually do with technologies. Research on the practices of secondary school-aged students with technologies is further limited still. Some research across primary, secondary and tertiary education using case study and mixed methods approaches has demonstrated the valuable insights gained through rich description of practice (Concole, et al., 2008; Corrin, Lockyer, & Bennett, 2010; Czerniewicz & Brown, 2014; Downes, 2002; Gronn, Scott, Edwards, & Henderson, 2014; Johnson, 2009a; Zhao & Frank, 2006). However, there is a need for more research that specifically investigates the practices of secondary school aged students, as young people attending secondary schooling are a group of learners distinct from primary or tertiary students. This particular group of students is characterised by increasing independence and the development of an identity separate from their family, and thus by the importance of

peer relationships (Davies & Eynon, 2013). As young peoples' networks of contacts spread, research too must consider practices across the various contexts in which they engage (Hopkins, 2013).

This paper presents an analysis of the empirical evidence from studies of secondary school students' uses of technology across their lives, including school and everyday life contexts. The purpose of this review is to synthesise empirical evidence, specifically descriptions of secondary students' technology uses at and outside of school. The remainder of the paper outlines the methodology used to search for and select the studies included in this review, the characteristics of the literature, key findings and implications for further research.

2.3 Methodology

This review addresses the following research questions:

1. How do secondary school students use technology at school?
2. How do secondary school students use technology outside of school?

To address to the research questions, studies that described details of students' technology use were reviewed. As the first and second question differ only in context, the search terms "student", "pupil", "adolescen*", "teen*" and "young people"; and "technology use", "technology practice", "ICT" or "digital" were used for both questions. To specify context, the additional search terms "secondary school", "secondary education", "high school" and "middle school" or "school and young people" were applied to the first question; and "secondary", "high school", "middle school" or "school and young people" and "outside", "everyday", "home" and "informal" were applied to the second question.

The literature search was conducted using the electronic databases Scopus and Web of Science. These databases offered the largest archives of multidisciplinary peer-reviewed literature. Searches using the keywords above were conducted in both databases and the results compiled. To ensure the relevance of the evidence, the search was limited to retrieve articles published between 2004 and 2015 (inclusive), which represents a decade of widespread computer use in schools and society. For accessibility purposes,

only articles written in the English language and with full text access were included. Additionally, results were limited to peer-reviewed journal articles as a measure of quality. A total of 737 articles were retrieved for the first research question and 178 for the second.

These articles were manually refined, through careful analysis of the abstract, methodology and findings of full text articles, based on the following criteria:

- Articles that presented empirical data reporting on details of students' technology use were included. Conceptual papers were excluded.
- Research that collected data from students (either directly or through direct observation) were included. This excluded a common line of inquiry that exclusively reported students' practices through the interpretations or perceptions of others (e.g. parents or teachers), which may be vulnerable to subjectivity and tends to result in incomplete accounts of practice.
- Case studies that investigated a specific use of a technology application (e.g. the creation of a blog or an intervention) were excluded because these were narrowly focused on specific technologies and did not capture the breadth of students' technology practices.
- Only studies that researched students with access to computer technologies at school and outside of school were included, allowing for comparison of experiences across settings. This consequently excluded research articles that reported on populations with limited to no access to computer technologies.

The application of these criteria identified 14 articles from the first question and 20 from the second for review. Most of the articles excluded did not present data on students' technology use, but instead investigated student perceptions, attitudes, attainment or competencies; used data collected from teachers about students' practices; or focused on a specific use of a technology application. Two articles that reported on school and outside of school practices were included in both questions.

2.4 Results

2.4.1 Question 1: How do secondary school students use technology at school?

The research aims of the 14 selected articles relevant to this question fell into two broad categories. Seven described student technology practices with the aim to produce understanding and insights into students' practices. The other seven articles focused on the value added by technology use or effects of technology use on teachers and students (Crook, Sharma, & Wilson, 2015; Crook & Sharma, 2013; Dunleavy, et al., 2007; Inan, et al., 2010; Lei & Zhao, 2007, 2008). In many of the 14 studies, description of student practice was not the main line of investigation. Thus the findings detailing student practice tended to be brief and preliminary to the focus of the investigation, providing only a cursory account of student practices in school. The key findings are outlined as follows.

Students used a range of technologies in secondary school. Three articles presented data on the range of technologies reported by US students in school (Crook, et al., 2015; Inan, et al., 2010; Lei & Zhao, 2007) and an Australian study reported on student use of computers in science subjects (Crook, et al., 2015). Technologies included email and subject specific software (Lei & Zhao, 2007), and more recent empirical studies added word processing, spreadsheets and presentation software, simulations, textbooks, tutorials, wikis, blogs, learning management systems, image and video editing and podcasting (Crook, et al., 2015; Inan, et al., 2010). This indicates the types of technologies being used in secondary schools, but does not provide insight into students' experiences with these technologies in school.

The technologies reported as most frequently used in secondary schools were word processing, spreadsheets and presentation software and online research (Crook, et al., 2015; Inan, et al., 2010; Lei & Zhao, 2007). Specifically, findings from two large-scale studies in the United States (Wang, et al., 2014) and United Kingdom (Kent & Facer, 2004) indicated that students most frequently used online research and word processing software, reporting that they these technologies at least weekly in school. For example, questionnaire data of over 1600 high school students indicated that over 75% of

students reported using computers weekly at school for writing and online research (Kent & Facer, 2004).

Qualitative findings were consistent with these large-scale studies, indicating a variety of technologies used in schools, including regular use of writing and presentation applications and online research (Charles, 2012; Dunleavy, et al., 2007). These findings suggest that students' technology practices at school consisted of routine uses of computers for relatively basic tasks. Several other articles investigated the nature of students' engagement with technologies by considering the design of technology integrated lessons (Beckman, Bennett, & Lockyer, 2014; Blikstad-Balas, 2012; Crook & Sharma, 2013; Inan, et al., 2010). The findings of these studies corroborate students' relatively low level of engagement with technologies, suggesting that technology integrated lessons often comprised direct instruction, teacher presentation or the teacher acting as a facilitator. This raises questions about the purposes for which technologies are used in school and whether they support student learning. Specifically, are technologies integrated into lessons with the intention to improve student learning, for efficiency or because teachers or students are or feel required to use technologies?

Technology supported lessons have the potential to foster student-centred learning opportunities (Inan, et al., 2010; Lei & Zhao, 2008). A US study observing 143 technology integrated lessons across 39 schools concluded that classroom practices tended to be more student-centred, rather than teacher-directed, when students used computers to perform online research and used word processing and presentation software in their learning at school (Inan, et al., 2010). Another study of the perspectives of teachers and students from middle- to upper-class backgrounds reported student-centred activities including using computers to communicate and collaborate with peers (Lei & Zhao, 2008). These uses included communicating with peers and teachers, sharing and evaluating work, creating websites, movies and music and contributing to learning management systems. However, the details of students' and teachers' practices in these student-centred tasks were not explained in these studies. Without such detail, it is difficult to determine exactly how the practices were student-centred so that they may inform teaching and learning. For example, online research might involve students designing search terms and analysing and reporting their results (student-centred) or could constitute students using teacher-directed search terms or

specified websites to answer specific questions. Thus, while such technology practices provide the *capacity* for student-centred learning, it does not necessarily mean that students have any control over their learning.

Research has demonstrated that technologies may also be used in schools with minimal effect on the underlying pedagogy or student learning. Four articles indicated that despite a shift toward the use of technology, in lieu of pen and paper or chalkboards, the underlying pedagogy remained relatively unchanged (Beckman, et al., 2014; Charles, 2012; Crook & Sharma, 2013; Dunleavy, et al., 2007). For example, one study sought to investigate students' engagement during technology integrated teacher instruction through lesson recordings from students' perspectives using head mounted cameras (Blikstad-Balas, 2012). The findings of the study revealed that students' engagement during these passively oriented lessons was most often unrelated to the lesson, with students using their laptops to play games, access news online and read blogs. Further, while technology may provide opportunities for participation, interaction or creativity, the same technologies may also be used in a passive manner (Beckman, et al., 2014; Charles, 2012; Luckin et al., 2009). Interview data from two studies revealed the superficial use of technologies in school (Beckman, et al., 2014; Luckin, et al., 2009). For example, while students reported using learning management systems in school, a technology that allows for interactivity and user contribution, their actual use involved only accessing lesson content provided by the teacher (Beckman, et al., 2014). Similarly, in a study of students' use of Web 2.0 technologies at school, findings revealed that the most common uses were sending and receiving email, watching videos online and using Wikipedia as an information source, applications that required only marginal student involvement (Luckin, et al., 2009). Considered alongside the studies that reported student-centred practices, these findings demonstrate that technologies do not determine particular ways of teaching or learning, but that the individuals (teacher and students) shape the ways technologies are used. This places importance on the design of data collection methods that capture the details of how and why technologies are used in schools.

These details of technology practice include consideration of the nature of student engagement with the technology and broader influencing factors. Three studies explored

students' level of engagement when using technologies at school, depicting student engagement as predominantly involving lower-order skills. One study of students and teachers adopted Bloom's digital taxonomy to differentiate kinds of technologies used according to the level of thinking involved in the task (Crook & Sharma, 2013). Application of the taxonomy indicated practices that spanned the categories, but predominantly tended toward lower-order skills including typing, basic online inquiry and reading textbooks. Supporting this finding, case study data of 12 students also reported that students often used short-cuts, such as cut and paste, when assigned inquiry tasks (Beckman, et al., 2014). Even where students were actively engaged in tasks, the tasks were seldom carried out in a way that led to a deeper understanding or a reflective approach (Samuelsson, 2012). Generally, these studies highlight the nature of students' thinking when using technologies, but they do not explain the reasons for the lower-order skills. Further investigation is required to establish whether students display lower-order skills as a result of their own level of competence with technology or how the teacher designs the lesson.

To gain a deeper understanding of students' technology practices, several studies considered broader influencing factors such as socio-economic status. These broader influencing factors include investigation of teachers and school culture (Wang, et al., 2014), age, gender and socio-economic background, and their influence on school practices (Kent & Facer, 2004). More specifically, students' socio-economic background, access to technology resources and skills outside of school were found to influence students' experiences with technology at school, with students from higher socio-economic areas with home computer access more likely to use computers at school (Kent & Facer, 2004). Another study indicated variations in the skill levels of students within socio-economic groups through an investigation of the internet search skills of 319 US students from low socio-economic backgrounds (Robinson, 2014b). Together, these findings suggest that socio-economic status may shape students' technology practices in school, but does not alone determine students' technology practices.

A small number of recent studies using a sociological framing have demonstrated the subtlety and complexity of students' technology practices. Specifically, four studies investigated factors that influence students' practices with technology at school

(Beckman, et al., 2014; Blikstad-Balas, 2012; Charles, 2012; Samuelsson, 2012). Student case studies suggested that inequalities in skills (Samuelsson, 2012) or varied dispositions toward technology use at school (Beckman, et al., 2014) may be shaped by students' family backgrounds and technology practices within the home. A case study of four students demonstrated the influence of lesson design on student engagement in the teacher's use of presentation technologies (Blikstad-Balas, 2012). Another case study of students and teachers considered negotiations for control or power between students and teachers in their use of new technologies in school (Charles, 2012). These sociologically framed studies also considered students' practices outside of school, highlighting differences between the contexts and how students negotiated their practices across contexts (Beckman, et al., 2014; Charles, 2012; Samuelsson, 2012). More specifically, the studies demonstrated that students did not instinctively transfer skills or see the opportunities to do so from one context to another. While most of these studies were relatively small case studies, they offer a more complete depiction of how and why students' engage with technology at school.

In summary, the 14 studies reviewed for this question identified a range of technology practices in schools for a variety of purposes, including inquiry, communication, production and creation. Of these, the most common were relatively basic tasks such as online research, word processing and presentations. Furthermore, the frequency of more sophisticated technology practices was relatively modest. Beyond descriptions of what technologies students used and how often they used them, the findings from many of these studies lacked finer detail about students' practices. This deficit suggests a need for research approaches and data collection methods that generate more comprehensive accounts of how students use technologies at school. The review included a small number of exploratory case studies that demonstrated the complexity of student practices by considering broader social and cultural influences on technology use. Studies such as these provide an understanding of not only what technologies are used, but also how and why students use technologies. Ultimately, this understanding may better inform effective technology integration in schools by helping us to understand the individual and contextual circumstances that lead to effective or ineffective technology practices.

2.4.2 Question 2: How do secondary school students use technology outside of school?

Twenty articles included in this review investigated students' technology use outside of school. The review evidenced a broad range of technology practices outside of school for two purposes: for everyday life purposes, including socialising and entertainment, and for academic or school related purposes. Eight of these articles explored students' academic related technology practices outside of school, while three focused on students' use of technology for everyday life purposes such as communication, entertainment and leisure. Seven articles investigated both academic and everyday life technology practices outside of school. Another common line of investigation pursued in 13 of the 20 reviewed articles was the investigation of technology practices and factors that influenced students' practices, including age, gender, physical access to technologies and parental occupations.

Everyday life contexts, including student homes, are sites of greater computer and internet use compared with students' practices at school (Harris, Straker, & Pollock, 2013; Kuhlemeier & Hemker, 2007; Meneses & Mominó, 2010; Wang, et al., 2014). Computer access in the home has become increasingly widespread in developed nations, and so too has students' technology use. Survey data collected in 2001 of over 7000 American students indicated that 35% used a computer daily and 49% reported occasional use in their everyday lives (Koivusilta, Lintonen, & Rimpelä, 2007). More recently, approximately 70% of students reported using computers at home every day (Barron, Walter, Martin, & Schatz, 2010; Hinostroza, Matamala, Labbé, Claro, & Cabello, 2015). Another recent study also indicated that students often now spend a significant amount of time on the computer, for example over one hour each day and an average of 7.2 hours a week on the computer (Harris, et al., 2013). Therefore, how students use technology outside of school is important to consider, as these practices have the potential to affect students' technology practices and learning at school.

Students use an increasingly broad range of technologies outside of school. Comparison of survey data from five studies from 2004 to 2015 that reported on students' uses of technology outside of school demonstrates an increase in the breadth of technology practices reported across the studies (Hinostroza, et al., 2015; Kent & Facer, 2004;

Koivusilta, et al., 2007; Kuhlemeier & Hemker, 2007; Wang, et al., 2014). Though the design of the survey tools limits the practices reported to those included in the survey (Kuhlemeier & Hemker, 2007), more recent studies report a broader range of more specific technology practices used by students (Wang, et al., 2014) than earlier studies (Kent & Facer, 2004; Kuhlemeier & Hemker, 2007).

Seven studies indicated that students' uses of technology for academic purposes outside of school largely reflected those performed at school. Focus group data demonstrated that young people used computers at school and home in similar ways for schoolwork (Persson, 2014). Commonly reported academic uses of technology outside and in school included online research, writing, creating presentations, working with spreadsheets and email (to peers, teachers and non-specified) (Baek & Freehling, 2007; Harris, et al., 2013; Kent & Facer, 2004; Koivusilta, et al., 2007; Kuhlemeier & Hemker, 2007; Persson, 2014; Wang, et al., 2014). Students' technology practices for school related tasks outside of school were influenced by what they did at school. This suggests that students perceive these tasks as different to what they do in their non-academic practices with technology outside of school. This may have implications for the transference of technological skills and knowledge between inside and outside of school contexts; for example, students may need to be supported to see the opportunities to apply skills and knowledge in different contexts.

A strong overlap between home and school technology practices was particularly evident in one case study within this review. The study focused on five students in a case study school that used a blended learning approach to the curriculum (Gurung & Rutledge, 2014). The blended learning approach comprised equal proportions of teacher instruction; technology assisted student regulated learning; and independent project work by students. Part of this involved students engaging in online tutorials (through school-based online applications) to personalise their learning as part of their education at school as well as outside of school. This particular approach demonstrates the importance of the purpose of the technology use, as students' technology practices for learning were the similar in both contexts.

Students used technology to communicate about academic work they did at home. Three studies documented students' use of email and chat rooms and social networking sites to communicate and collaborate on academic work (Baek & Freehling, 2007; Greenhow & Robelia, 2009; Khan, Wohn, & Ellison, 2014). Case studies of 11 American students described how students used social networking sites to assign tasks, check progress and clarify teacher instructions with their peers (Greenhow & Robelia, 2009). These kinds of uses of technology were additional to the academic task set by the teacher, demonstrating how students adapted the use of social technologies for educational purposes. While these social technologies afford a method to facilitate academic work outside of school, such uses can be superficial, since, as in these studies, they often centre on the exchange of shortcuts and efficiency measures – a generally superficial practice (Baek & Freehling, 2007). Overall, these findings indicate that students' use of technology for academic purposes outside school largely reflected their practices at school, featuring a relatively narrow range of technologies and engaging with only the basic functions of the applications.

Besides academic uses of technology, students' technology practices outside school centred on communication and entertainment. Findings from eight studies demonstrated that students used technology frequently for communication. Students in earlier studies reported using email and mobile phones to communicate with others in their everyday lives (Kent & Facer, 2004; Koivusilta, et al., 2007; Kuhlemeier & Hemker, 2007). For example, a survey study of almost 7000 young people in Finland reported that students most frequently used their mobile phones for communication (Koivusilta, et al., 2007). These forms of communication were also reported in more recent research on social networking, demonstrating the prevalence of use of these communication tools (Greenhow & Robelia, 2009; Khan, et al., 2014; Persson, 2014; Rosen, Carrier, & Cheever, 2013; Wang, et al., 2014). While the means of digital communication may have changed over the last decade, the prevalence of this use of technology has remained.

Students' technology practices for entertainment purposes varied according to personal interests (Gurung & Rutledge, 2014). The evidence reported a broad range of practices, with varying numbers of students reporting specific practices, but most often student use was not ubiquitous. Overall, commonly reported practices included surfing the

internet, playing games and watching, listening to and downloading music and videos (Gurung & Rutledge, 2014; Hinostroza, et al., 2015; Kent & Facer, 2004; Koivusilta, et al., 2007). The diversity of students' practices may not be surprising given that 60% of students reported having autonomy over their technology practices at home (Harris, et al., 2013). This contrasts students' technology practices for academic work at home, suggesting that students did not have the same level of autonomy when engaging in these tasks.

When students engage in technology practices outside of school with relative autonomy (for example, Harris, et al., 2013), they must manage their time when using technology for learning. Two studies investigated how students multitask and task-switch when using computers, including working online. One study described the multitasking behaviours of 11 case study students (Baek & Freehling, 2007). Students described examples of practices that they considered facilitated their learning, such as listening to music while writing, and those that hindered learning through distractions unrelated to the task at hand. Findings from a larger-scale study observed the task-switching behaviours of 263 young people while studying at home (Rosen, et al., 2013). The findings indicated that students who preferred to multitask had more technologies (unrelated to the task) available to them, including mobile phones, social networking sites and other websites, and were more often off-task than others. The findings of these studies demonstrate that some technologies were not conducive to student learning. This raises questions about students' ability to regulate their learning, as an increasing range of technologies is integrated into their learning, including the use of devices such as laptops, tablets and mobile phones.

Many of students' technology practices outside of school were online. Five studies focused on developing a deeper understanding of the diversity of students' online practices (Baek & Freehling, 2007; Eynon & Malmberg, 2011; Gil-Flores, Torres-Gordillo, & Perera-Rodríguez, 2012; Robinson, 2014a; Smith, et al., 2013). Two of these five studies developed typologies to categorise students' internet use (Eynon & Malmberg, 2011; Robinson, 2014a). A survey study of 779 students in their homes developed four internet user profiles (Eynon & Malmberg, 2011). These profiles were developed based on students' practices, including information seeking, communicating,

entertainment, creativity and participating online. The profiles demonstrated categories of internet users, ranging from young people who were frequently engaged in all categories of internet practices (14%) to those who reported low levels of all categories of practice (31%). Another study focused on categorising the online information synthesis practices of American teens (Robinson, 2014a). The study investigated the opportunity structures (access to digital resources and knowledgeable others) and personal dispositions of motivated students. The study indicated three categories of motivated students, based on their opportunity structures (high or low access to resources) and disposition toward learning with technologies (self- or other-reliant, exploratory or task orientated, synergistic or linear). The findings demonstrated the complexity of practice in highlighting how subtle factors shaped students' varied online technology practices.

In recognition of students' varied practices, a number of studies have aimed to understand the source of these variations. Four articles explored the influence of gender and/or age on students' practices (Harris, et al., 2013; Hinostroza, et al., 2015; Kent & Facer, 2004; Kuhlemeier & Hemker, 2007). Generally, these studies found that boys displayed a disposition towards gaming technologies, while girls preferred communication technologies. Older students also spent more time engaged in academically oriented technology practices than in everyday life technology uses compared to younger secondary school students. However, while some patterns of use were reported, there were also variations within students' age and gender groups. This indicates that while age and gender may shape patterns of technology use, they do not alone explain differences in students' technology practices.

Home contexts are sites of significant diversity, and thus have been the focus of investigation. Thirteen articles explored various socio-economic and parent related factors and their potential influence on students' technology practices, including:

- investigation of the family socio-economic status (Baek & Freehling, 2007; Gil-Flores, et al., 2012; Hinostroza, et al., 2015; Kent & Facer, 2004; Khan, et al., 2014; Koivusilta, et al., 2007; Meneses & Mominó, 2010; Robinson, 2014a; Smith, et al., 2013);

- access to technology within the home (Barron, et al., 2010; Eynon & Malmberg, 2011; Khan, et al., 2014; Kuhlemeier & Hemker, 2007; Robinson, 2014a; Smith, et al., 2013); and
- parents' educational level (Koivusilta, et al., 2007).

Across these studies, the findings suggested that families of higher socio-economic status were more likely to possess technology devices. Similarly, parents with higher levels of education were more likely to value education and academically oriented technological practices. The culture of technology use in the home, including parental regulations of technology use and family and friends' practices, influenced students' familiarity with certain technologies and uses (Eynon & Malmberg, 2011; Robinson & Schulz, 2013). Some of these technology practices are directly relevant to school technology practices. For example, knowing how to conduct an effective online search is more directly relevant to online research for schoolwork than knowing how to play a particular computer game. Studies of these influencing factors provide some understanding of the diversity in students' technology practices and how students' experiences with technologies at home may be of varying relevance for learning at school.

Several studies framed these contextual factors using theoretical lenses. Theories such as boundary theory (Persson, 2014) and learning ecology were used to theorise the influence of context on learning (Barron, et al., 2010; Eynon & Malmberg, 2011; Greenhow & Robelia, 2009; Gurung & Rutledge, 2014). Both theories perceive students as learning within multiple contexts and consider implications as students navigate between contexts. These studies highlighted various accounts of students learning technology skills and using technology to learn, as well as discussing how their practices overlapped contexts. These studies, particularly those that used interview and observation methods, highlighted the diversity of students' personal preferences, experiences and circumstances in shaping their technology practices within and across contexts (Gurung & Rutledge, 2014; Persson, 2014). Conversely, studies that used survey methods were more limited in illustrating "the complex dynamic processes of development and learning" (Barron, et al., 2010; Eynon & Malmberg, 2011, p. 586; Greenhow & Robelia, 2009). This suggests that exploratory research approaches are

more valuable in highlighting the complexities of students' technology practices than large-scale surveys.

Three articles adopted a sociological framing to extend these rich but localised descriptions of practice toward theorising students' use of technology. Robinson and Schulz's research (Robinson, 2014a; Robinson & Schulz, 2013), framed by Bourdieu's sociological theory of practice, highlighted the intricacies of technology practices outside of school. The articles detailed how access to technological resources, networks of support and student dispositions provide opportunities for the development of technology related skills and knowledge. Drawing on elements of Bourdieu's theory and Bakhtin's notion of dialogic negotiation, another study investigated the social and cultural nature of students' engagement with digital texts (Bulfin & North, 2007). Using these theoretical lenses, the study depicted students' practices as connected to context and adaptable to the various contexts students occupy. Guided by sociological theory, the exploratory nature of these studies have progressed understanding of students' practices by detailing some complex and relational influences on students' technology practices.

It is important to note that this research question focused students' practices with technology outside of school. However, seven of the 20 articles centred only on investigation of the home context, and seven other studies did not specify contexts within the study of outside of school practices. The remaining six articles referred to students' use of technologies at friends' and relatives' homes, the library, after school clubs and programs and community centres, but did not provide details of students' practices in these contexts (Baek & Freehling, 2007; Barron, et al., 2010; Bulfin & North, 2007; Gurung & Rutledge, 2014; Meneses & Mominó, 2010; Robinson, 2014a). Thus, few studies provided comprehensive accounts of students' practices across the various contexts of their lives. This raises questions about whether students use technology in other contexts or data collection methods have failed to capture these practices. These questions highlight that there is still more to learn about students' technology practices in everyday life contexts outside their homes.

Within the literature reviewed, a majority of studies used survey methods (15 of 20). These quantitative findings have yielded important details about frequency and range of

practices, but offer little in understanding the complexities of students' technology practices (Eynon & Malmberg, 2011). A smaller number of qualitative studies adopted more exploratory methods, including interviews (Baek & Freehling, 2007; Bulfin & North, 2007; Greenhow & Robelia, 2009; Gurung & Rutledge, 2014; Kent & Facer, 2004; Persson, 2014; Robinson, 2014b; Robinson & Schulz, 2013), observations (Bulfin & North, 2007; Gurung & Rutledge, 2014; Rosen, et al., 2013) and diary records and document analysis (Bulfin & North, 2007). These methods produced descriptions of practice and student perceptions providing a deeper understanding of a smaller number of student uses of specific technologies outside of school. Perhaps challenges of gaining access and other ethical considerations when collecting qualitative data on or with students outside of school contexts may have limited the scope of research to date. These findings demonstrate that there is still much to be learned about how students use technology outside of school. The following discussion will explore how future research can build on the insights gained from these studies to further understand how secondary students use technologies.

2.5 Discussion

This review of empirical research has demonstrated that students' technology practices across school and outside of school contexts were generally multifaceted, but showed distinct differences. Secondary school student technology practices for academic purposes included an increasingly broad, but sporadically used range of technology applications. Students regularly used a narrow range of technologies, including online inquiry, word processing, spreadsheets and presentation software, as part of their learning at school. Evidence indicated that students engaged in similar technology practices for academic purposes outside of school. Uses of technology for everyday life purposes outside of school were more diverse and personalised. The evidence reviewed suggested that students had more autonomy in their technology practices outside of school for everyday life purposes, as reflected in their use of technologies for their particular personal interests. Yet, there is still much to learn about what students do with technology and why they choose to engage with technologies in the ways that they do. Qualitative and quantitative approaches are complementary in contributing to an understanding of students' practices. As demonstrated in this review, the two approaches provided breadth and depth of data. Yet, this review also revealed that there

is still much to understand about the broader contextual issues that shape students' technology practices. The findings suggest that the physical locations are not as important as the purpose of the technology use and the social and cultural factors that define the contexts in which technology is used.

Contexts are more than physical spaces; they encompass embodied elements and social structures. Several studies explored a range of contextual variables to gain a deeper understanding of students' technology practices. This research highlighted the influence of family ideology and culture on students' technology practices. The most commonly researched variable in this review was the influence of socio-economic status on students' uses of technology. This often involved investigation of physical elements including access to physical resources and the limitations or opportunities afforded by access (Barron, et al., 2010; Eynon & Malmberg, 2011; Khan, et al., 2014; Kuhlemeier & Hemker, 2007; Robinson, 2014a; Smith, et al., 2013). A smaller number of studies went beyond physical resources to investigate social structures, including regulation of technology practices, parents' education levels and others' technology practices (Eynon & Malmberg, 2011; Koivusilta, et al., 2007; Robinson & Schulz, 2013). These less obvious influences reveal the subtle social structures that influence how students use technologies.

A number of studies explored the relationship between school and outside of school (Baek & Freehling, 2007; Charles, 2012; Harris, et al., 2013; Kent & Facer, 2004; Persson, 2014). The findings of these studies evidenced some technology practices as transferrable across contexts, while others were not (Gurung & Rutledge, 2014). However, these conclusions were drawn from investigation of students' practices at home and school as separate contexts, with little consideration of the context of practice as involving both. Considering practice within a context would recognise the relationship between the context and the individual in shaping the technology practice. Thus, there is scope for more comprehensive research that explores technology practices within school, home and other contexts across students' lives, and that considers the physical as well as social and cultural aspects of context and how they shape technology practice. Specifically, future research should adopt approaches that facilitate the exploration of technology practices with consideration of the physical, social and cultural contextual structures associated with them.

Detailed research into students' technology practices in context poses ethical and logistical challenges. This includes, for example, considerations of methods that facilitate the collection of data on students' practices across various contexts, including homes and community spaces, which can be especially challenging when conducting researching on or with minors (Hopkins, 2013). These challenges are compounded as technologies become increasingly mobile and accessible, because students may be using technologies in an increasing range of contexts and in new ways. Few of the studies reviewed collected data on students' practices outside of the school or home context, with only six studies reporting non-specific technology use in community and homework centres and at friends' and family members' homes (Baek & Freehling, 2007; Barron, et al., 2010; Bulfin & North, 2007; Gurung & Rutledge, 2014; Meneses & Mominó, 2010; Robinson, 2014a). The most detailed descriptions of and insights into practice were obtained through studies that collected multiple data sources, including observations, interviews and diary methods (Bulfin & North, 2007; Gurung & Rutledge, 2014). This suggests that research approaches that use qualitative methods and triangulation of data to generate detailed accounts of practice may be fertile methods to better understand the complexities of students' technology practices.

Analysis of the studies reviewed provides insight into how students use technology at school and outside of school, but the findings are localised and fragmented. Theory offers a means through which these fragmented descriptions may be connected through consideration of the wider complexities of practice, providing a framework to explore factors of context. Theories including learning ecology (Barron, et al., 2010; Eynon & Malmberg, 2011; Greenhow & Robelia, 2009; Gurung & Rutledge, 2014), Bourdieu's theory of practice (Beckman, et al., 2014; Bulfin & North, 2007; Robinson, 2014a) and Bakhtin's dialogic negotiation (Bulfin & North, 2007) have provided a research framework that considered not only the technology uses under investigation, but also the broader context of technology practices.

Sociological theory may be one approach to investigating technology practices within the contexts in which they occur. A sociological lens not only provides a means through which to understand practices in context, but also places focus on a critical investigation

of the contextual structures and their influence on practice. There is undoubtedly scope for sociologically guided research that explores students' technology practices across their lives, including school, home and other contexts of technology use (Kerr, 1996; Oliver, 2013; Selwyn, 2012). It is notable, though, that the studies within this review theorised practices outside of school, but not those at school. This may be a significant oversight, as research suggests that schools may "contribute to the establishment of digital inequalities among students" (Samuelsson, 2012, p. 117). Therefore, the findings suggest a need for critical analysis of the social and cultural aspects of schools and how they shape students' technology practices.

It is acknowledged that this review is limited in its scope. A number of inclusion criteria were applied to delineate this review to include literature that reported on high-quality research, presenting empirical evidence on secondary students' technology practices. A number of limitations resulted. This included literature that researched younger and older students' practices with technology was excluded. The findings of this review therefore do not represent the developmental nature of students' technology practices through different life stages. Additionally, research detailing students with limited or no access to technology was also excluded from this review. As a result this review provides insights skewed towards students in developed countries with ready access to computers and the internet both at school and outside of school. It is acknowledged that the review does not provide a comprehensive account of all students' practices, but rather a synthesis of the practices of those secondary school students who have access to technology in schools and outside of school.

Challenges were also encountered because of the absence of shared terminology that could be used as search terms. To ensure that the review included relevant literature, various synonyms were included in the search criteria, including common variations for "school" and "student". However, developing search criteria that captured research on technology use was challenging. "Technology use", "technology practice", "ICT" and "digital" are some of many keywords used by researchers. This was necessary because of shifts in vocabulary over time and according to the preferences of various communities of researchers. This lack of shared language is a limitation of this review, and also poses limitations to locating and synthesising research in the field of

educational research more broadly. This consequently limits the opportunities to participate in critical discussion and progress understanding in the field.

2.6 Conclusion

This review synthesised current research on students' technology practices at school and outside of school. The review demonstrated that students' technology practices were more complex than popular opinion depicts. Students' practice at school and outside of school was diverse and multifaceted, but generally narrow for educational purposes (inside and outside school) and broader for everyday life uses. Students used a range of technologies for various purposes according to context. The evidence reviewed also suggested that technology practices were influenced by factors of context, including others' practices, rules governing technology practices, age, gender and socio-economic status. This review of current research demonstrates that there is still a great deal to learn about how and why students use technologies. In order to progress understanding of students' technology practices, research must move beyond localised descriptions and toward establishing a deeper understanding of students' technology practices through theorising the tools and practices in which students engage. This will help to ensure that technology integration in schools is more effective and more inclusive.

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CHAPTER THREE

Conceptualising educational technology in schools through a Bourdieuian sociology

"The function of sociology, as of every science, is to reveal that which is hidden"
(Bourdieu, 1998, p. 17).

Foreword

This paper is prepared for publication as **Beckman, K**., Bennett, S. & Lockyer, L. 'Conceptualising educational technology in schools through a Bourdieuian sociology' in *Learning, Media and Technology*. The paper provides an introduction to the theoretical framework of the study, Bourdieu's theory of practice, and explores its application in the field of educational technology in schools through a review of relevant literature. *Learning, Media and Technology* was selected as an appropriate location to communicate Bourdieu's sociology and application to school students' technology practices to a specialist educational technology audience in a clear and concise format (8000-word limit).

The purpose of this chapter as part of the thesis is to provide a comprehensive description of the theoretical constructs and explain the position of the researcher. This paper presents a conceptualisation of students' technology practices according to Bourdieu's theoretical constructs of field, habitus and capital, which underpin the study methodology. Specific detail about how Bourdieu's theory has shaped and underpinned this study is included in the methodology chapter (Chapter Four). The conceptualisation of Bourdieu's theoretical constructs in relation to students' technology practices is key

to understanding how they have been studied and presented in the data and analysis. It is intended that this theoretical background and description of the theoretical constructs in the presentation of the data and analysis will enrich reading of the findings and discussion in the subsequent chapters.

3.1 Abstract

Despite an extensive body of educational technology research, there is still is much we do not fully understand about students' technology practices. To achieve a deeper understanding of students' technology practices, research must explore the influence of social and cultural factors in shaping technology practices. Bourdieu's theory of practice (1977) is proposed as an example of sociological theory that can be adopted in educational technology research to move towards understanding the wider complexities of technology practices. This paper explores the application of Bourdieu's theoretical constructs of field, habitus and capital in the field of educational technology in schools through a review of relevant literature. We argue that the field of educational technology research will benefit from a sociological framing to reveal the reasons for students' technology practices. The paper offers a fresh approach to the investigation of students' technology practices by presenting a theoretical framework based on Bourdieu's theory of practice and invites its application in future research so that it can be critiqued and further developed.

3.2 Introduction

Despite an extensive body of educational technology research, there is limited research that provides a holistic understanding of students' technology practices, particularly of their social and cultural contexts. Much of the empirical research to date has focused on the affordances of particular technologies and their effects on teaching and learning, often without taking into account the broader aspects of education and society (Oliver, 2011; Selwyn, 2012). For example, numerous studies examine the type and frequency of student technology use, affordances of technology use and specific effects on student learning (Crook, et al., 2015; Hinostroza, et al., 2011; Wang, et al., 2014). While these studies have been valuable in highlighting immediate practical implications and advancing particular learning theories and teaching strategies, they cannot contribute to broader understandings of technology practices in education (Bennett & Oliver, 2011). Specifically, they cannot address questions about the broader social and cultural factors that may influence students' technology practices and improve understanding of how and why students use technologies for particular purposes.

Perhaps the lack of research in this area is, in part, a failure to conceptualise digital technologies as social tools that exist outside the classroom as well as inside. Technology practices do not exist without the individuals who use them and the contexts in which they are used; thus, "they cannot be studied in isolation from society or from one another" (Sterne, 2003, p. 385). Many of the digital technology tools commonly integrated into education have been adapted from other contexts to suit practices within educational contexts. Research in the field of educational technology would benefit from a sociological framing that pays attention to the understandings of learners and considers the social and cultural milieu of technology practices (Erstad, 2012; Selwyn, 2012). However, despite their application in science and technology disciplines to frame technologies as social, sociological studies are relatively rare in the field of educational technology (Oliver, 2013; Selwyn, 2012). The promise of sociological research in various disciplines has motivated calls for a more critical approach to the investigation of technologies for learning that extends beyond immediate practicalities (Bennett & Oliver, 2011; Kerr, 1996; Selwyn, 2010). The inclusion of these types of studies within the literature can address questions of how individual, physical, social and cultural structures interrelate to shape technology practice.

Bourdieu's theory of practice (1977) is one example of sociological theory that has been applied in other areas of educational research, particularly to explore class, gender and educational aspirations of students (Archer et al., 2012; Bok, 2010; Dumais, 2002; Reay, 1995). Such successful applications suggest that these concepts may be used by educational technology researchers towards a more holistic understanding of the broader complexities of technology practice. Specifically, Bourdieu's sociology, over that of some other sociologists, offers a means to explore technology practices through the interrelations between individual, physical and social structures. This is particularly relevant to the conceptualisation of educational technologies as social tools. This paper presents Bourdieu's theory of practice and its application to the investigation of educational technology in schools. The paper offers a conceptual framework, discusses the contribution and limitations of the theory and invites its application to future research of students' technology practices.

3.3 Bourdieu's theory of practice

Bourdieu's theory of practice is a science of human practice (Wacquant, 1998). His theoretical constructs serve as theoretical and methodological tools for systematic analysis of social phenomena. Central to the theory is the emphasis on the dialectical relationship between objectivism and subjectivism (Bourdieu, 1990a). The theory of practice perceives action as taking place within a social world, but also perceives the social world as being internalised within the individual (Bourdieu, 1990a). More specifically, the theory of practice considers practice as more than actions of an individual; practices also encompass social and cultural relations, systems and structures, and the meaning the practice holds in the individual's life. The dualistic relationship between the individual (embodied) and the social world (objective) is intrinsic in all Bourdieu's theoretical constructs.

This paper will focus on Bourdieu's central theoretical constructs: field, habitus and capital. Formally, Bourdieu summarised practices as a product of the relations between field, habitus and capital: "[(habitus)(capital)] + field = practice" (Bourdieu, 1984, p. 95). According to Bourdieu, an individual's practices are both structured by their habitus and capital within the field occupied, and structuring, in that they shape future practices. Field, habitus and capital are relational constructs that do not act, nor can they be understood, independently.

Before discussing each of these concepts, it is important to note that Bourdieu constantly warned to "beware of words" and the accumulated, value-laden nature of their social construction (Bourdieu & Wacquant, 1989, p. 54). Accordingly, Bourdieu adopted purposefully selected language in which to communicate his concepts in an attempt to escape common-sense assumptions. However, this has resulted in much criticism of his arduous language and extensive explanations (Jenkins, 1992). The following section attempts a concise explanation of Bourdieu's key concepts intended to provide an accessible introduction to his theory for educational technology researchers.

3.3.1 Field

Bourdieu asserted that to understand people and their practices, it was necessary to understand them in light of examination of the social space (Bourdieu, 2005). It is with this social orientation that Bourdieu's concept of field was founded. Fields are social domains rather than physical spaces, and so defined by the individuals who occupy those domains; that is, their "networks of social relations, structured systems of social positions" (Everett, 2002, p.60). "Each field has its own distinctive logic of practice" (Grenfell, 2012, p. 68), or accepted way of behaving. Participants in a field share common beliefs, an adherence to which determines one's membership of the field (Bourdieu, 1990b).

An individual's world is comprised of many fields, which they traverse as they go about their lives. The limits of each field are bounded by the effects of the field; thus, a field's boundaries exist where the effects of the field cease (Bourdieu & Wacquant, 1992). For example, school students occupy a number of social fields, including the school field. While schools are physical locations, they are also defined by social relations, systems (rules and policies) and positions (teacher as authority). Students' homes, too, are physical spaces, but also social spaces defined by the family members and beliefs of the family social group.

3.3.2 Habitus

Habitus is an individual's "history turned into nature" (Bourdieu, 1977, p. 78). Habitus is the internalisation or embodiment of one's history, encompassing all circumstances and experiences that shape the individual's way of being and acting within and perceiving the social world (Bourdieu & Wacquant, 1992). This is not to say that one's actions are determined by habitus, but rather that habitus shapes an individual's tendency or disposition toward ways of being, acting and perceiving. As habitus is shaped by an individual's experiences and circumstances, which are subject to change, habitus too evolves because it is constantly subject to experiences that either support or transform it (Bourdieu & Wacquant, 1992). Bourdieu elaborated: "the habitus acquired in the family underlies the structuring of school experiences…and the habitus transformed by schooling, itself diversified, in turn underlies the structuring of all subsequent experiences…and so on, from restructuring to restructuring" (1977, p. 87).

The early influences of family and school are formative experiences, meaning that habitus is durable but also capable of evolving (Bourdieu & Wacquant, 1992).

Members of a field generally share common beliefs (Bourdieu, 1990b). An individual's habitus both structures and is structured by these shared beliefs (Bourdieu, 1977). The shared belief or accepted norm is known as doxa. Doxa is internalised and thus also subject to evolving as individuals traverse between fields, negotiating their doxic practices according to field.

3.3.3 Capital

An individual's ability to succeed or manoeuvre in a field (i.e. their position in the field) is determined by their capital. Capital refers to assets that may include cultural and material goods and wealth that are derived through developing and maintaining social relationships, networks, skills and knowledge. The value of capital is determined by the field through recognition by others (Bourdieu, 1990a). Thus, an individual's capital may vary in value across fields. For example, a student's skills in and knowledge of online gaming, which assure powerful status in an online gaming field, may have little or no value within the school field.

There are a number of forms of capital (Bourdieu, 1986a). Economic, cultural and social capital are some of the most documented. Economic capital is "monetary and material wealth, commodities, and physical resources" (Everett, 2002, p. 62) that are "immediately and directly convertible into money" (Bourdieu, 1986a, p. 243). According to Bourdieu, all other forms of capital are derivative of economic capital (Bourdieu, 1986a). For example, the concept of cultural capital was developed through empirical work investigating students' varied scholastic achievements (Bourdieu, 1986a). Variations in students' achievements were found not to result from their biological aptitude but rather from their cultural capital as determined by their social class. Cultural capital includes knowledge, skills, taste, lifestyle and qualifications, which may be embodied, objectified or institutionalised (Bourdieu, 1986a). Embodied capital is culture internalised by individuals (and into their habitus); for example, manifest in their taste, poise or accent. Objectified cultural capital is the objectification of cultural capital in material objects, but only inasmuch as an individual's ability to

appropriate it into embodied capital (Bourdieu, 1986a). For example, a student may have access to a computer in their home, but this equipment is only considered objectified cultural capital if the student appropriates its use into the development of their own technological skills, knowledge or taste (cultural capital). Institutionalised capital relates to academic qualifications, which bestow cultural competence upon the individual (Bourdieu, 1986a). For example, completing a technology elective subject at school provides a school student with a level of specialist qualification. Social capital refers to “useful relationships that can secure material or symbolic profits” for the individual (Bourdieu, 1986a, p. 249). An individual’s social capital is determined by the size or number of networks, the capital that the members of the networks possess and confer and the individual’s ability to derive benefit from these networks of connections (Bourdieu, 1986a).

3.4 Bourdieu, education and technology

Bourdieu’s contribution to the sociology of education was based on his professional experiences in the French education system, during which he theorised education as an institution of cultural domination and reproduction of social class structures. Specifically, educational institutions confer the knowledge and skills of the dominant classes, and in turn legitimise these as scholastic aptitude of students within these social classes (Bourdieu, 1984, 1988; Bourdieu & Passeron, 1990). Educational researchers and commentators have critically reviewed Bourdieu’s theory of practice for its relevance to contemporary educational research (Grenfell & James, 1998; Mills & Gale, 2007; Nash, 1990; Reay, 2004; Robbins, 2004). Despite criticisms, many of which stem from Bourdieu’s ostensibly complex language and writing, his theory of practice is regarded as offering researchers a means to consider broader social aspects of education, uncovering abstruse aspects that are often overlooked or presumed.

Bourdieu’s sociological theory prescribes a research focus broader than that of the phenomena or individuals under investigation (Reay, 2004). The theoretical constructs of field, habitus and capital provide a means with which to understand the relational nature of social structures and individual practice (Nash, 1990), thus yielding “insights and understanding not readily visible in other approaches” (Mills & Gale, 2007, p. 2). The theory of practice places attention on the subtle, obscure or hidden structures and

systems within education, including student social inequalities, the educational field of power and the reproductive hierarchy and structure of educational institutions (Grenfell, 2010; Mills, 2008; Mills & Gale, 2007). For this reason, educational research has taken up Bourdieu's theory, particularly his concept of capital, to highlight student social inequalities and the social structures of the school field and the impacts upon students' ability to 'play the game' or succeed in school (Bok, 2010; Dumais, 2002; Mills & Gale, 2010; Taylor, 2005). Despite a number of proposals and calls to action, the application of his concepts in educational technology research has been modest (Grenfell, 2009; Robbins, 2004; Selwyn, 2004, 2012).

In educational technology research, Bourdieu's theory has been applied to a small number of studies investigating technology practices for learning beyond the confines of school. These studies have demonstrated the impact of broader social and cultural structures across students' lives on their technology practices for learning. Specifically, this line of inquiry has centred on students' homes, the influence of family experiences and circumstances and the relationship between home and school. Bourdieu's emphasis on social class structures lends itself to the investigation of factors including family practices and perceptions (Cranmer, 2006; Hollingworth, Mansaray, Allen, & Rose, 2011) as well as class and socio-economic status (North, Snyder, & Bulfin, 2008; Robinson, 2009; Sutherland-Smith, Snyder, & Angus, 2003). The findings of these studies have demonstrated the formative influence of family background and experiences on students' technology practices. Specifically, students' familiarity and skills with, and knowledge of, particular technology uses at school have been found to be shaped by the value their families place on the use of technologies for learning. Specifically, families who value education tend to encourage the use of technology applications with specific relevance to learning and school practices, compared with families who have few guidelines for technology use and use technologies for predominantly social or leisure purposes. These findings suggest that to understand technology practices within one field, such as school, we must also understand the ways students use technologies across their lives.

Since Bourdieu theorises practices as embedded in or belonging to the field, his constructs have also been applied to explore the relationship between school, home and

other everyday life fields of technology practice (Beckman, et al., 2014; Bulfin & North, 2007; Johnson, 2009a). The findings of these studies extend our understanding of students' technology practices beyond descriptions of what students do with technology, and toward an understanding of the underlying logic that structures their engagement with technologies. These studies demonstrate how family habitus, capital acquired in the home and past experiences with technologies inform the underlying logic behind students' practices.

Within the existing body of educational technology research drawing on Bourdieu's sociology, researchers have tended to focus on particular elements. Table 3 presents examples from a literature review of the application of Bourdieu's theoretical constructs in educational technology research. The table outlines how empirical studies have conceptualised and applied elements of Bourdieu's theory of practice.

Field has largely been applied to the investigation of students' homes, particularly physical conditions, including the presence and distribution of digital resources available in the home (e.g. Czerniewicz & Brown, 2013, 2014; Robinson, 2009). Habitus has been used to conceptualise the distinction between social classes and associated tastes for technology practices (e.g. Bulfin & North, 2007; Lee, 2008; Robinson, 2009, 2014a). Capital has been appropriated in various forms and adopted to conceptualise socio-economic structures in relation to students' technology practices (e.g. Cranmer, 2006; Czerniewicz & Brown, 2012; Hollingworth, et al., 2011; Kapitzke, 2000; Robinson, 2014a; Sutherland-Smith, et al., 2003). These studies provide valuable contributions to understanding students' technology practices, but there has been a tendency to isolate parts of the theory rather than adopting it in its entirety.

Use of an overarching theoretical frame provides a common conceptual measure, enabling comparisons to be made between findings, and thus progressing from the often fragmented research outcomes of atheoretical research (Maton & Moore, 2010; Zhao & Frank, 2006). Key to the theory of practice is the relational nature of the theoretical constructs that were intended to be considered collectively (Bourdieu & Wacquant, 1992). A selective application of Bourdieu's theory of practice might be considered a misuse of the theoretical constructs (Bourdieu & Wacquant, 1992; Grenfell, 2009, 2010). However, Bourdieu himself described his theory of practice as "*open* concepts

designed to guide empirical work" (Bourdieu, 1990a, p. 107, emphasis in the original). Therefore, in the field of educational technology research, where theoretically informed research is modest, this paper argues that the field may benefit from a sociological framing, even if it initially constitutes taking up elements of theory rather than the whole.

3.4.1 Conceptualising technology practice through a Bourdieuian sociology

The inaccessibility of Bourdieu's writing may be one reason for its modest adoption in educational research. Bourdieu's writing was made accessible to a broader audience with its translation into multiple languages including English only recently; and his language is often perceived as ambiguous (Jenkins, 1992). But perhaps another reason for its modest adoption in educational technology research is that Bourdieu did not theorise or investigate digital technology practices in his work (Sterne, 2003). However, as society changes and digital technologies become more pervasive, research has begun to apply the theory to contemporary technology practices. Table 3 provides an overview from a review of the literature of the application of Bourdieu's theoretical constructs in educational technology research. Specifically, the table outlines how each construct, field, habitus and capital, has been conceptualised and measured in empirical research into educational technology.

Table 3 Application of Bourdieu's theoretical constructs in educational technology research

Construct	*Empirical measures*
Field	
Objectified	• Spatial and temporal factors of access (Robinson, 2009) • Quality of technologies (Czerniewicz & Brown, 2014) • Infrastructure (electricity, internet connections) (Czerniewicz & Brown, 2013)
Embodied	• Autonomy in technology use (Beckman, et al., 2014)
Habitus	• Dispositions – disposition toward technology use for learning (Beckman, et al., 2014); self-reliant or other-reliant stances toward information synthesis (Robinson, 2014a); orientation toward and taste for internet use (Robinson, 2009); experimentation approach toward using new technologies (Johnson, 2009b; Kapitzke, 2000); inclinations toward internet use based on class (Lee, 2008) • Practices with digital texts internalised (Bulfin & North, 2007) • Doxic practices of home technology use (Beckman, et al., 2014; Johnson, 2009a, 2009b) • Parent's beliefs about technology use and expertise (Johnson, 2009b) • Students' value of technology practices (Beckman, et al., 2014; Bulfin & North, 2007)
Economic capital	• Economic capacity to purchase computers and networks (Kapitzke, 2000; Robinson, 2014a); possession of technologies (Cranmer, 2006; Czerniewicz & Brown, 2012; Hollingworth, et al., 2011)
Cultural capital	
Embodied	• Number of books in the home (Czerniewicz & Brown, 2014; Hatlevik, Guðmundsdóttir, & Loi, 2015) • Computer attitudes, use and competencies (Kapitzke, 2000; Tondeur, Sinnaeve, van Houtte, & van Braak, 2011) • Motivation and capacity to implement internet search strategies (Robinson, 2014a) • Capacity to negotiate cyber-relations (Johnson, 2009a) • Involvement in techno-culture (Kapitzke, 2000) • Socialisation into technology practices by family and friends (Beckman, et al., 2014) • Time invested into developing technological skills and knowledge (Beckman, et al., 2014) • Family orientation toward education and technology (Cranmer, 2006; Czerniewicz & Brown, 2012; Hollingworth, et al., 2011; Sutherland-Smith, et al., 2003)
Institutionalised	• Formal computer training course (Czerniewicz & Brown, 2012)
Social capital	• Networks of technological support (Czerniewicz & Brown, 2012, 2013); technological support from parents (Cranmer, 2006) • Bridging, bonding and maintaining social capital in social networking (Ellison, Steinfield, & Lampe, 2010; Mazzoni & Iannone, 2014)

Selwyn (2004) and Kvasny and Truex (2000) offer conceptualisations of Bourdieu's constructs applied to technology practices. Selwyn (2004) used Bourdieu's sociology to demonstrate the messy reality of students' access and practices. Specifically, he explored digital inequity by identifying technological capital as a subset of Bourdieu's cultural, economic and social forms of capital. In so doing, he reframed perceptions of "have" and "have-not" students to consider the origin of their varied capital and value within educational contexts. Kvasny and Truex (2000) provided a condensed summary of Bourdieu's theory of practice as it relates to information technology in general, but not specifically to students or education. These conceptualisations provide not only a means to understand the underlying logic of technology practices, but also a theoretical framework that may inform empirical research.

Drawing on relevant conceptual and empirical work, school students' technology practices are conceptualised using Bourdieu's sociology (Table 4). Table 4 outlines technological manifestations of Bourdieu's field, habitus and capital. This expansion is by no means exhaustive, but is intended as a theoretical framework to inform empirical research into student technology practices; to frame technology practices as embedded in the field; and to move toward understanding students' practices with technology so that it may better inform their use for learning in schools.

Table 4 A theoretical framework for school students' technology practices based on Bourdieu's theory of practice

Construct	*Technological manifestations for school students*
Field	
Objectified	• Technology resources available and accessible • Location and distribution of technological resources
Embodied	• Culture of technology use (including rules, others' perceptions and practices) • Position in the field in relation to technological capital • Being attuned to the "rules of the game" of technology practices
Habitus	• Circumstances or background, including family structure and parents' and siblings' occupations • Personal disposition toward technology • Past and present experiences with technology • Doxa (shared beliefs and accepted practices with technologies) • Personal beliefs and perceptions about the value of technologies • Possibility of success or profit (interest) as a result of technology practices
Economic capital	• Family *economic capacity to purchase* technology *hardware and software* • Technology resources available
Cultural capital Embodied	• *Investing time into self improvement of* technology *skills, knowledge and competencies in the form of informal learning* • *Participation in* technology *education and training – both formal credentialized and informal non-credentialized*
Objectified	• Appropriation of *technocultural goods* into embodied cultural capital
Institutionalised	• Formal technology training/courses
Social capital	• *Networks of 'technological contacts' and support. These can be:* – *Face-to-face: family, friends,* teachers, others – *Remote: online help facilities,* online forums

Note: Terms directly quoted from Selwyn (2004, p. 355) are indicated in italics.

This table shows that Bourdieu's sociology is an expansive toolkit. Application of the theoretical framework in empirical research would involve the investigation of the multiple fields in which individuals engage, and encompass many more participants than the individual central to investigation. In the case of studying school students' technology practices, an investigation using the theoretical framework above would include exploring students' practices at school and in a range of everyday life fields (both online and offline), and investigating the technology practices of students' friends, teachers, parents and siblings. While much of the literature has focused on students'

backgrounds and practices outside of school, and their influence on students' school practices, it is also necessary to investigate the school field. A critical reflection of school fields, specifically their structure, culture and habitus, may allow for comparison between the individuals and the institution.

This research strategy is comprehensive but arduous, the logistics of which perhaps have limited the application of this theory in educational technology research to date. Another limitation of a Bourdieuian sociology is its preoccupation with class structures and its apparently deterministic perspective of cultural reproduction, particularly in relation to education. Arguably, the determinist view of human agency, where individuals are fated to endure the social position into which they were born, has little to offer educational research (Jenkins, 1992). However, habitus is shaped through experiences, including those at school, which is a significant field in the structuring of students' habitus. Thus, schools need not be a field only of reproduction, but also have the potential to be a field of transformation through researchers and educators embracing an awareness of and critical reflection on the structures and systems that may perpetuate social and cultural inequalities (Mills, 2008). This means that exploration of school fields may highlight structures or practices, such as school rules or lesson design, which reproduce or transform students' technology practices. Ultimately, conceptualising the school field in this way may lead to changes in such systems and practices and student learning with technologies.

Bourdieu's theoretical constructs were born out of his empirical research, and thus were intended to be methodological tools with which to study social phenomena (Grenfell, 2012). The review of current empirical research reveals there is certainly scope, moreover, a need for sociologically informed research of this kind in the field of educational technology. The investigation of student technology practices, guided by Bourdieu's concepts of field, habitus and capital, can contribute to understanding students' general practices, their practices for learning, and the relationship between the school and everyday life fields. We offer this conceptualisation of technology practices through Bourdieu's theoretical constructs and invite its application to the investigation of students' technology practices so that it can be critiqued and further developed.

3.5 Conclusion

In this paper, we have reviewed the current empirical research using Bourdieu's theory of practice to investigate school students' technology practices. These studies have contributed to the field of educational technology research by highlighting that technologies are social tools, and that students' practices are complex and influenced by a broad range of social and cultural factors. The issues raised in this paper present challenges for educational technology researchers in understanding the complex language and adopting an arduous methodology. Yet the application of Bourdieu's theoretical constructs offers a fresh approach to investigating technology practices across students' lives in a rigorous manner and providing a common conceptual measure.

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CHAPTER FOUR

Methodology

"To produce a precise science of an imprecise, fuzzy, woolly reality"

(Bourdieu & Wacquant, 1992, p. 23).

Foreword

This chapter presents the research methodology in a conventional thesis chapter format. While the research methodology is presented in each of the four papers that follow, key details of the methodology could not be clearly communicated in the brief format of a journal article. Therefore, the purpose of this chapter is to explain the research methodology in its entirety.

The design and methods of this study have been carefully considered to address the issues raised in Chapters Two and Three, and will thus be presented in detail. As outlined in Chapter Two, there is a need for empirical research that investigates students' technology practices, moving beyond description and toward a deeper understanding of their practices. To address this gap in the research, this study explored how and why students use technology according to context, adopting Bourdieu's theory of practice to conceptualise the individual, physical and social aspects of practice and context. As detailed in Chapter Three, Bourdieu's theory of practice is an empirical as well as a theoretical tool, and therefore crucial to the method, in that all research considerations flow from it (Grenfell, 1998; Mills & Gale, 2007).

4.1 Introduction

The purpose of this study was to investigate how and why secondary school students use technology at school and in their everyday lives. To do this the study considered three research questions:

1. What are the characteristics of students' technology practices in their everyday lives and at school?
2. How do contextual factors influence students' technology practices?
3. Why do students use technologies?

Bourdieu's theory of practice (1977) helped to conceptualise students' technology use as a social practice encompassing individual, physical and social factors that shape practice across multiple contexts. The study employed Bourdieu's theory of practice in the overall study methodology, and in doing so offered a theoretical framework of students' technology practices (Chapter Three).

The study adopted a qualitative multiple embedded case study design, involving four classes comprising 64 students and their four teachers, from two high schools. Key to the case study research design was the collection of data:

- From multiple data sources yielding rich descriptions;
- Considering contextual influences including students' experiences, circumstances and beliefs, and other field participants' technology practices; and
- From the perspective of the participant, allowing technology practices to be framed within students' lives, including at school and in their everyday lives.

This research design was developed with the aim of generating rich data that described students' technology practices and, more importantly, show underlying logic of students' technology practices.

This chapter provides comprehensive details of the research design and methods, as guided by the theoretical framework. The research is framed by the paradigmatic orientation. Next, the research design is presented; then each phase of the study is outlined in detail. Finally, the chapter details the data analysis methods, procedures to ensure the integrity of the data and ethical considerations of the research.

4.2 Research design

4.2.1 Research paradigm

Reading Bourdieu and working with his theory leads one to an acute awareness of the underlying paradigm and the associated ontology, epistemology and methodological assumptions that structure the research design, processes and analysis. Bourdieu described his paradigmatic approach as constructivist structuralism or structuralist constructivism (Bourdieu, 1989). His ontological approach is a dialectic presupposition between the objective and subjective, which he described as "a science of the dialectic relations between the objective structures to which the objectivist mode of knowledge gives access and the structured dispositions within which those structures are actualised and which tend to reproduce them" (Bourdieu, 1977, p. 3). This means that the researcher needs to be aware of the tensions that exist between the objective and subjective. This implies a dual approach: a personal and context specific relationship between the researcher and participant, but also a responsibility of the researcher to be reflexive (Lincoln & Guba, 2013).

The guiding paradigm has methodological implications for acquiring knowledge. Bourdieu's methodological polytheism means that he did not adhere to a specific methodology (Wacquant, 1998). Instead, the concepts of field and habitus drive his methodology and most importantly, "all other considerations seem to flow from them" (Grenfell, 1998, p. 156). Thus, throughout this chapter Bourdieu's theoretical constructs will be justified against the methodological design.

4.2.2 Qualitative approach

As discussed in Chapter Two, there is a need for more contemporary educational technology research that provides a holistic understanding of students' technology practices. There is thus a need for research that aims to extend beyond descriptions of students' technology practices by explaining how and why students use technologies according to context. This research aimed to address this gap in contemporary understandings by exploring students' technology practices from their perspective and with consideration of the contexts in which their practices occur, which is characteristic of qualitative research.

Qualitative research is the study of research problems that are social in nature through examination of the meanings held by the individuals or groups involved. Denzin and Lincoln (2011) offer a comprehensive definition:

> Qualitative research is a situated activity that locates the observer in the world. Qualitative research consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations…qualitative research involves and interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them. (Denzin & Lincoln, 2011, p. 3)

Therefore, the strength of qualitative research lies in exploring social phenomena that are not well understood and where variables are not readily identifiable. Thus, qualitative inquiry was deemed most suitable, as it allowed the researcher to explore the more subtle details of students' technology practice and the underlying logic behind their practices through multi-faceted, holistic accounts of the socially constructed nature of the participants' reality (Cilesiz, 2011; Merriam, 1998). Moreover, the field of educational technology research would benefit from qualitative research that investigates students' experiences, perspectives and contextual influences, as such research would add depth to the current understanding of students' technology practices and supplement the understanding behind these practices (Cilesiz, 2011).

4.2.3 Case study

Case study research allows for the investigation of holistic and meaningful characteristics of real-life phenomena (Yin, 2009). Case study research is an all-encompassing method "covering the logic of design, data collection techniques, and specific approaches to data analysis" (Denzin & Lincoln, 2011; Merriam, 1998; Yin, 2009, p. 14). Case study research is suggested by Yin to be especially suited to investigating "a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (2009, p. 13).

A case study approach was deemed most appropriate to address the research aims of the study because it allowed for the investigation of the phenomenon of students'

technology practices that considered both everyday life and school contexts. This was particularly appropriate when considering technology practice, as the boundaries between the phenomenon and context are interconnected, not distinct, as discussed in Chapters Two and Three. Furthermore, as suggested by Yin (2009), the case study research strategy is enhanced through the use of theoretical propositions. In this case Bourdieu's theory of practice (1977) guided data collection and analysis; this will be detailed in the subsequent sections.

To maximise understanding through breadth of data and in-depth detail, the study used a multiple embedded case study design. A multiple case study design is one in which more than one case is studied (Yin, 2009), and an embedded case study design allows for the investigation of specific units of analysis within the case. In this study the units of analysis consisted of four class cases (including the students and the teacher) and 12 embedded individual student cases. Figure 1 depicts the multiple embedded case study design, outlining both class and student cases (Stake, 2000). The multiple embedded case study design was appropriate for this study as it allowed the researcher to examine the technology practices of students and teachers from four classes; it was supplemented by rich description and understanding through in-depth case studies of 12 purposefully selected students (Figure 1). Thus, the class cases provided breadth of data, while the student cases provided depth of understanding with minimal disruption to participants.

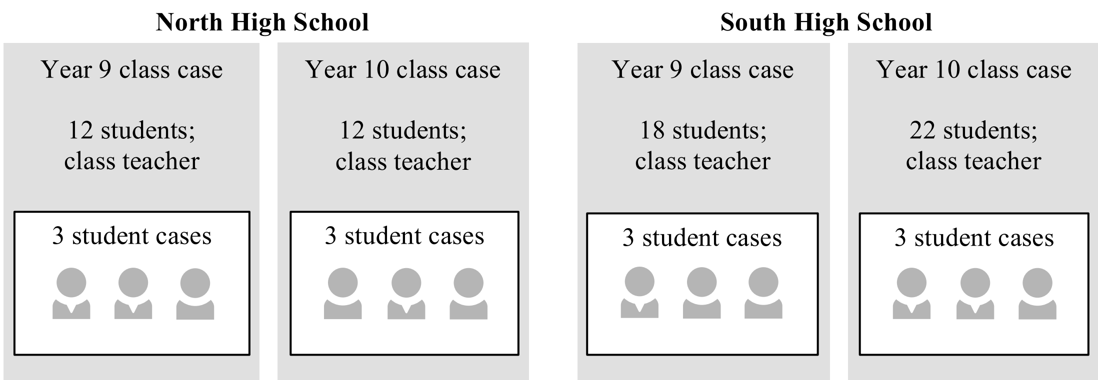

Figure 1 Multiple embedded case study design

The participants in this study were students enrolled in Years 9 and 10 of secondary school. At the commencement of the study, the participating schools and students were involved in the Australian Commonwealth government’s one-to-one laptop initiative through the *Digital Education Revolution* (New South Wales Department of Education and Communities [NSW DEC], 2012). While this government initiative has since concluded, technology remains dominant in the education policy agenda. More recently, national curriculum documents have outlined technology as a general capability of all students across primary and secondary schooling (ACARA, 2013c). Therefore, research that investigates students’ technology practices is increasingly significant, considering there is little current research that investigates secondary school students’ technology practices, as outlined in Chapter Two.

The study comprised four class cases: a Year 9 and 10 class case from each participating high school. These grades were selected to be part of the study due to their inclusion in the Australian Commonwealth government’s *Digital Education Revolution* one-to-one laptop program (NSW DEC, 2012). This initiative saw each student from Years 9 to 12 in public secondary schools issued with a laptop, specialised with software and capabilities for educational practices. This provided the opportunity to study students with access to computers in all classes. The cases under investigation were instrumental cases. Stake (2000) outlines that instrumental cases are of no particular significance to the research questions, but serve to provide insight into the phenomenon. Details of the cases, the school context, and class and student cases were examined to provide depth of understanding of students’ technology practices. The specific cases played a supportive role in providing insight into the phenomena of students’ technology practices, with the class and student cases facilitating understanding (Stake, 2000).

The selection of multiple cases allows for themes and patterns to be explored through across-case analysis (Creswell, 2007). These themes and patterns across cases may be further elaborated when collecting data from more than one research site where variations in context are expected. Therefore the selection of two Year 9 and two Year 10 class cases from each of two schools provided opportunity to compare and contrast more than one school context within the time frame of the study. The selection of four classes was deemed ample to establish themes and allow for analysis across classes,

within schools and between grades and schools. The selection of 12 student cases was also appropriate to yield ample detailed descriptions within the designated research time frame. Yin (2009) suggests that common conclusions derived from multiple cases "expand the generalizability" of the findings compared to a single case (p. 53).

The multiple embedded case study design shaped the phases of data collection: Phase 1, collecting data from the four class cases; and Phase 2, containing the 12 student cases. Figure 2 depicts the phases of data collection and the data collection methods.

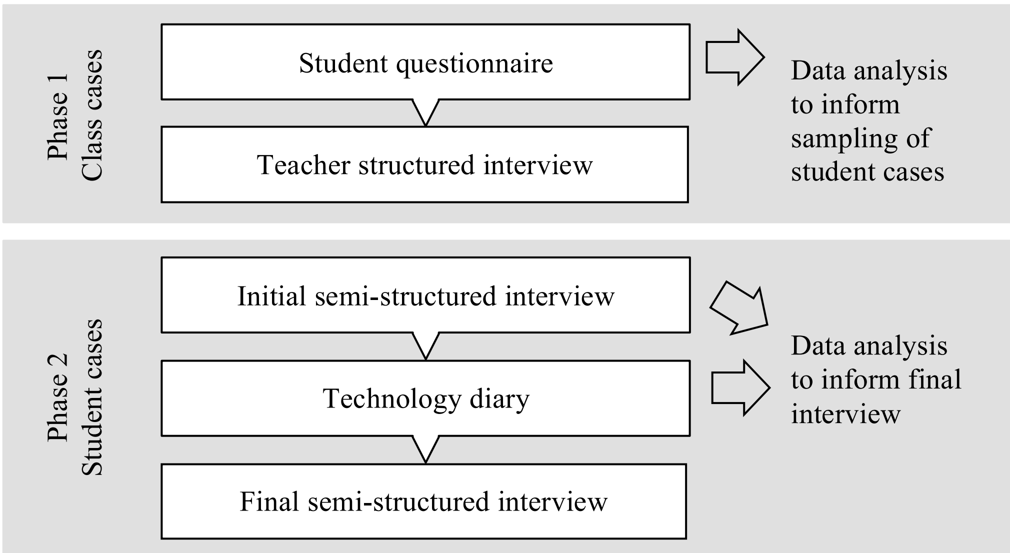

Figure 2 Study phases outlining data collection and initial data analysis

Phase 1 had dual purposes in the research. First, this phase characterised each class, including the students and teacher, as a case in terms of students' technology practices at school and in their everyday lives. Data collection in Phase 1 involved the teachers and students from each class case. For the class case, students completed a questionnaire, and each class teacher was interviewed. An interview is most appropriate to obtain data that spans time and space and is not attainable through other methods (Denzin & Lincoln, 2011; Merriam, 1998). In this study the teacher interview collected accounts of teachers' technology practices and their perspectives on technology for learning relating to the class case and their teaching in general. This was the most appropriate method to gain a broad understanding of the teachers' practices and perspectives regarding the use of technology in school. Questionnaires are useful when

collecting data about the same characteristics from a large sample (de Vaus, 2014). In this study questionnaires containing both closed- and open-ended questions were used to collect data about students' backgrounds, access to technology at home and technology practices at school and home for academic and other purposes. This was the most appropriate way to collect this data from the large sample of students in a time efficient manner. The results of the questionnaire were analysed qualitatively, rather than statistically.

Phase 1 generated breadth of data on students' technology practices. This was important to establish the characteristics of students' technology practices in their everyday lives and at school, thus providing data from which to select 12 intrinsic student cases. Maximum variation sampling (Merriam, 1998) was used to purposefully select the 12 students as cases for the subsequent phases. Maximum variation sampling allows the researcher to select individuals for study who provide insights into the research phenomenon (Creswell, 2007). In this study a number of criteria were developed (see Phase 2, Recruitment), based on the class case data and theoretical framework to select the 12 student cases that represented variation in the criteria.

The purpose of Phase 2 was to supplement data collected in the first phase, providing depth of understanding of students' technology practices produced from the embedded student cases using multiple data sources. Phase 2 collected detailed data from the 12 student cases regarding each student's technology practices, with consideration of the milieu in which they occurred. These included an initial semi-structured interview focused on students' general technology practices and beliefs; a technology diary in which students recorded all technologies used over a two-week period; and an interview that explored the technology practices recorded in the diary (Figure 2). Interviews are a particularly relevant strategy when researching human behaviour beyond a specific observable act (Yin, 2009). This was the most effective method to collect data from student participants about their range of technology practices and across various contexts, and to gain insight into their perspectives. To obtain more specific accounts of students' technology practices, student cases recorded all technologies used over a two-week period in a technology diary. Diary methods allow for the collection of data at a personal level, generating accounts as they occur in their natural, spontaneous context (Bolger, Davis, & Rafaeli, 2003). Collecting data on practices within context, over an

extended period of time was the most appropriate means to reconstruct students' technology practices. Further details of these data collection methods and protocols will be elaborated in this chapter.

4.2.4 Theoretical framing – Practice *of* theory

Bourdieu's theory of practice, over that of other sociologists, offers a means to:

- Investigate student practices through rigorous (when adopted in the research methodology) and multifaceted inquiry (when using multiple elements of the theory (as outlined in Chapter Three) (Grenfell, 2012),
- Highlight the interrelations between the individual, physical and social structures, including the role of schools in effecting students' practices; and
- Yield data that may be commensurate with other empirical evidence using Bourdieu's theory.

Though arguably ambiguous, the theoretical constructs of field, habitus and capital provide a means with which to understand the relational nature of social structures and individual practice (Nash, 1990), thus yielding "insights and understanding not readily visible in other approaches" (Mills & Gale, 2007, p. 2). The application of Bourdieu's sociology in this study will be outlined in detail throughout this chapter demonstrating how it shaped the design of the study, data collection tools, protocols and analysis.

This study used Bourdieu's theory of practice to investigate *students* and their technology practices as they traversed school and everyday life fields. Thus the approach of this study was to gain an understanding of the student and their technology practices within fields, including how their perceptions, dispositions, circumstances influenced their practices and ability to select, adapt and use technologies in particular ways. While more traditional Bourdieuian inquiry investigates a particular field of practice through exploring all participants involved, and the systems and structures of that field, the focus on the individual may yield insights into technology practices across fields and how students' practices in everyday life fields impact their practices in the school field. One example of this approach is a case study of New Zealand teens that used Bourdieu to investigate their technology practices across home and school fields (Johnson, 2007). This study highlighted tensions associated with students' practices as they traversed these fields of technology practice.

To achieve a holistic understanding of the students and their technology practices, it was important to explore all aspects of practice including habitus, capital and field. While the theory does not need to be applied in its entirety, as demonstrated though the tendency of researchers to take up aspects of the theory as outlined in Chapter 3, this study adopted all key constructs of Bourdieu's theory of practice including field, habitus and capital. A more holistic understanding may be gained through investigation of all the relational elements of practice (Bourdieu & Wacquant, 1992; Grenfell, 2012). Thus this study used a case study design to explore field, habitus and capital in relation to students' practices.

Bourdieu's theory of practice is a theory of research practice. In other words, the theory of practice is an empirical as well as a theoretical tool, and therefore crucial to the method, in that all research considerations flow from it (Grenfell, 1998; Mills & Gale, 2007). To demonstrate the rigor of such a methodology, Bourdieu outlined three guiding principles that underpin his approach to conducting research:

1. Construction of the research object;
2. a three-level approach to studying the field of research: determining the position of the field in relation to other fields, analysing the objective structures of the field and the participants of the field and analysing the habitus of the participants; and
3. participant objectivation (Grenfell, 2009).

These guiding principles, although they are presented here in a sequential order, are not necessarily linear when applied to research; rather, they are relational and acknowledge each other (Grenfell, 2012). These guiding principles were considered at the outset of the research. Specifically, these principles influenced the epistemology, study design, selection and design of data collection tools, protocols, the researcher's engagement in the field and data analysis. The application of each guiding principle is outlined in this section, but elements of these principles are carried throughout this chapter and the thesis.

The object of research of this study was the investigation of student *technology practices*. The use of Bourdieu's theory warns of social construction of the language, and even of the researchers' choice and construction of the object of research (Bourdieu & Wacquant, 1989). Therefore, in line with the ontological foundations of the study,

technology practice was conceptualised as encompassing the technological device and the individual's practice and context (Lievrouw & Livingstone, 2002). Specifically, technology practice is defined as more than the use of the technology; it also involves the social and cultural relations, systems and structures, and the meaning the practice has in the individual's life (Chapter One gives a more detailed definition of technology practice, along with other key terminology). This construction or conceptualisation of technology practice in turn shaped the selection and design of the data collection tools. Specifically, open-ended questionnaire items, interviews and diary records were selected to allow for an exploratory approach to data collection and to prioritise the perspective of the participant.

The field of research must also be considered with the same critical and reflexive approach. To do this, Bourdieu's theory of practice advocates a three-level approach to studying the field of research. Specifically, this involves considering the position of the field in relation to other fields. This study investigates students' technology practices in relation to making a theoretical and practical contribution to the field of education. Therefore, this study focuses investigation of students' technology practices with consideration of the school field of technology practices, but also investigates these in relation to the everyday life fields of student technology practice.

Second, studying the field of research involves analysing the objective structures of the field and the participants within the field. In this study, this proposed the investigation of students as well as other field participants, including teachers, other students and students' family, and the positions they hold within the school and everyday life fields of technology practice. It is acknowledged that students' school and everyday life fields encompass many more participants including, school executive and administrative staff, peers, family and friends. The scope of this doctoral thesis involved the participation of students and their teachers, and the data collection tools were designed to explore the technology practices of others through the perspective of the student participants. Finally, the habitus of the participants was analysed through inquiry into their backgrounds, past and present technology experiences and dispositions. The thesis endeavours to demonstrate how these theoretical constructs are conceptualised in the study, in the design of the instruments and through rich description of the manifestation

of field, capital and habitus in relation to students' technology practices in the study findings and discussion. Further detail of the three levels of studying the field of research will be discussed throughout this chapter and will be made evident throughout the findings, discussion and conclusion.

The theory of practice invites the researcher to apply the same level of analysis to themselves as to their object of research (Grenfell, 2012). Participant objectivation is the process where the researcher attempts to acknowledge their biases and subjective nature of their involvement with the research. Bourdieu outlined three biases – social, field and intellectualist – that threaten to "blur the sociological gaze" of the researcher (Bourdieu & Wacquant, 1992, p. 39). Social bias relates to the social origins of the researcher, including aspects such as class, gender and ethnicity; field bias is linked to the position of the researcher in the academic field; and intellectual bias refers to the "scholarly gaze" that the researcher "casts upon the social world" (Bourdieu & Wacquant, 1992, p. 69). Participant objectivation is not intended to be a cathartic preface to the research, but rather considered throughout the course of the research (Grenfell, 2009). The three levels of biases are considered along with the role of the researcher in the following section.

4.2.5 The researcher

The nature of the researcher's involvement in the research process determines the construction of the research object and aspects of the research design. The three levels of biases are outlined to acknowledge the researcher's subjective involvement with the research. The researcher's social biases came from her working class background in the area in which the study was conducted; therefore it could be inferred that the researcher shared the class origins of the research participants. The researcher's field bias was multifarious, in that the researcher was a doctoral candidate within the academic field, but had also worked previously as a schoolteacher. Thus, it was feasible that the researcher unconsciously assumed the persona or position of a teacher in her relations with participants in the field. Perhaps most difficult to address is intellectualist bias, as it pertains to the researcher's scholarly gaze. In this case, the purpose of educational research is to address a research problem, upon which this thesis is centred. However, Bourdieu warned that this preoccupation could narrow or obscure the researcher's

ability to observe and describe the research object for what it is (Bourdieu & Wacquant, 1992). To some extent the researcher's intellectualist bias was mitigated by the exploratory nature of the study. Specifically, the data collection process was an exploratory one, demonstrated through the selection and design of data collection methods (described in the following sections), which overall aimed to listen to students. Thus, during data collection and the first level of analysis the researcher's focus was to investigate students' varied experiences and perceptions rather than a preoccupation with the research problem.

Researchers are advised, on the other hand, to use their knowledge and skills of working with children to inform research design in selecting appropriate research methods and procedures (Greig, Taylor, & MacKay, 2007). Though possible biases relating to the researcher's background as a schoolteacher are acknowledged, this experience was valuable to the researcher's selection of data collection methods; design of instruments (specifically, the wording of questions and the technology diary); establishing a rapport with students and creating positive interactions (Fontana & Frey, 2000); and the use of the use of visual stimuli (technology lists and technology diary) to facilitate discussion during interviews.

When conducting interviews with students, a power imbalance is heightened in a one-on-one interview between the researcher and student participant because of the age and status difference (Corsaro, 2005). To address the issues of researcher biases and power imbalance between the researcher and student participants, the researcher established a collaborative research relationship with participants. Further, it was vital that the researcher empower student participants by continually reminding them that they were part of the research process; investigating *with* the researcher as opposed to the research being conducted *on* them (Corsaro, 2005). With this in mind, when introducing the study to the student participants, the researcher presented herself as an academic and schoolteacher; more importantly, the researcher emphasised the deficit of research focusing on students' perspectives and the aim of this study to address the gap in the research. The purpose of disclosing the research aims was to place the student participants at the centre of the research; moreover, it emphasised the significance of their perspectives, with the intention to alleviate the power imbalance.

4.3 Research methods

4.3.1 Data collection protocols

Teacher interview

To describe and analyse students' practices in the school field, the school field must be established in terms of its participants and their positions within the field. Therefore, the purpose of the teacher interview in this study was to provide insights into the school field of students' technology practices. According to Bourdieu's theory of practice, all field participants exert influence over practices within the field (discussed in Chapter Three); thus it was theorised that teachers and their technology practices potentially shaped those of the students (Bourdieu, 1977; Bourdieu & Passeron, 1990). Additionally, the teacher interview allowed for the triangulation of data from students and teachers regarding technology practices at school, particularly pertinent considering the self-reported nature of the data sources.

The purpose of the teacher interview was to gain a broad understanding of technology practices for learning at school, through exploring teachers' technology practices and their perspectives on technology for learning. The interview used a structured interview protocol with unstructured follow-up questions by the researcher that further probed participants' practices and perspectives. Specifically, an interview method was most appropriate because it allowed the researcher to glean data that spanned time and space and that was not attainable through other methods (Denzin & Lincoln, 2011; Merriam, 1998), including:

- A breadth of data regarding teachers' technology practices
- Frequency of technology practices
- Insight into the underlying logic of these practices
- Perspectives on students' technology practices and their own practices.

The interviews probed teachers about their perspectives and technology practices for school related purposes. Teachers' school related practices with technology included administration, lesson preparation, organisation, lesson presentation and, during lessons, using technologies themselves and directing and guiding students' use of technologies. Teachers were also questioned about students' technology practices, including the

devices they observed students bringing to school, their perspectives on students' technology related skills and knowledge and their beliefs about technology use for learning and the place of technology education (Appendix D contains the teacher interview protocol). Questions included "What do you see as the students' interests in regards to technology?" and "What do you want your students to get out of the use of technology in teaching and learning?"

Questionnaire

The purpose of the questionnaire was to yield data about the technology practices of students in the class cases. The questionnaire data characterised each class as a case in terms of students' range of practices with technology at school and in everyday life, their family backgrounds and their technology preferences and perspectives. The student questionnaire is presented as Appendix E.

The questionnaire items probed students' backgrounds, including information about their family members and their technology practices, their access to and use of technologies at home and school, their perspectives about themselves as a technology users and the use of technology for learning (Appendix E contains the questionnaire items). Following the guiding sociological framework of the study, the questionnaire items were designed to provide insights into field, habitus and capital. Appendix F outlines the design and alignment of the questionnaire items with the theoretical framework. Data relating to the occupations of the students' parents was collected and mapped according to the Australian Bureau of Statistics occupation classifications (Australian Bureau of Statistics [ABS], 2013a), ultimately with the aim of aligning them with associated levels of skills and education, and thus cultural capital. Although this item informed the selection of student cases, there was insufficient detail in these classifications alone to analyse associated capital; thus further data was collected.

The questionnaire comprised closed items relating to students' access to and frequency of use of technology devices in the home. Closed items were used to focus participants' responses to digital technologies associated with learning. The remaining questionnaire items were open-ended, including questions such as "What do YOU use technology most for at school and why?" (Appendix E). The inclusion of open-ended items in the

questionnaire allowed the student participants to express their perspectives. Central to the aims of the study was to capture students' perspectives; thus it was key that the questions allow students to express what they deemed as relevant or important and not to be confined by the questionnaire items. The nature of the questionnaire items, yielding qualitative rather than quantitative data, was comparable to a structured interview. The advantage of using a questionnaire method compared to structured interviews was the convenience of administering the questionnaire to all students in the class cases, which allowed the researcher to collect data from a larger sample and minimise disruption to the class and student learning.

To enhance the reliability and credibility of the questionnaire data, a number of careful considerations were made, as is particularly necessary when collecting questionnaire data from young students. These considerations include ensuring that questions were simple and unambiguous, and used language appropriate for the participants (de Vaus, 2014). Thus, the wording of the questions were carefully considered and tested in the pilot phase. Minor changes were made to the wording and order of questions based on clarification required during the pilot phase's data collection. The questions were presented in increasing order of abstraction, beginning with simple, closed questions (name, age) and background information and access to technology, to descriptions of technology practices and, ultimately, expressing perspectives and beliefs about technologies.

Student interviews

Initial semi-structured interview

The purpose of the initial semi-structured interview was to establish student participants' technology practices at school and in their everyday lives. More specifically, the scope of the interview was to gain an overview of students' technology practices and yield details of their background and experiences with technologies, family and friends' technology practices and beliefs about technology. The initial semi-structured interview protocol is presented in Appendix G. The design of the questions was carefully considered to ensure that the participants could understand them easily; this included single lines of questioning, using simplistic and context specific terminology and avoiding difficult or abstract wordings.

Characteristic of case study interviews, the interview followed a specific line of inquiry, using semi-structured, open-ended questions (Yin, 2009). While the nature of inquiry was relatively exploratory, the guiding theoretical framework provided a structure for exploration while remaining fluid and asking conversational probing questions; thus a semi-structured interview method was employed. The interview questions were designed with consideration of Bourdieu's concepts to show the underlying logic of students' technology practices. Appendix H demonstrates the alignment of the interview questions with the theoretical constructs. The design of the interview questions should not lead the participant (Grenfell, 1998; Merriam, 1998), but encourage students to describe their experiences, practices and beliefs through their perspective; for example, "How did you learn to use a computer and the Internet?" Conversational follow-up questions probed *how* and *why* students used technology to add understanding to their responses. This strategy facilitates a friendly and nonthreatening conversational approach to the formal structured interview (Yin, 2009).

Interviews were chosen as the most effective method to collect data from student participants about their range of technology practices across various contexts, and to gain insight into their perspectives, attitudes and beliefs. Yin (2009) advises that interviews are particularly relevant when researching human behaviour. It was important in this study that these behaviours or practices were explored through the participants' eyes, providing important insights into their realities or truths. The interviews involved students providing descriptions of their family's technology practices. Though this method of second-hand reporting may be subjective, it was deemed the as the most appropriate method for a number of reasons. Firstly, the students and their perspectives were the focus of investigation rather than the study of others in the field. While perspectives are innately subjective, they communicate reality through the participants' worldview (Grenfell, 1998). Secondly, first hand accounts of family practices would involve going to student's homes and other sites of technology use to observe and/or speak to all other members of their family. Therefore, second-hand reporting was deemed most appropriate to avoid data collection being overly onerous on the student participants and their families. Furthermore, educational researchers contend that the interview is one of the strongest methods to adopt when

attempting to explore children's and young people's interpretations of their lives and to demonstrate how they make sense of and contribute to societal processes (Corsaro, 2005; Eder & Fingerson, 2002).

Final semi-structured interview

The purpose of the final interview was to yield detailed understanding of the underlying logic behind students' technology practices that they had recorded in the technology diary. The final interview was different to the initial interview in that it focused on the details of students' specific technology practices, as recorded in the diary, in contrast to the initial interview, which discussed practices more generally.

Some interview questions were tailored according to students' technology practices in each case. Appendix I presents one example of the final semi-structured interview protocol. The interviews asked a range of relatively unstructured questions that probed students' diary entries and explored themes, patterns and unexpected practices recorded in the technology diary. The interview questions were designed with consideration of Bourdieu's concepts to elicit the underlying logic of students' technology practices. Appendix J demonstrates the alignment of the interview questions with the theoretical constructs. The researcher used the diary as a stimulus for conversation in which the researcher and student could refer to specific entries. The researcher also shared her initial data analysis with each student to stimulate discussion of patterns of use. The initial data analysis was presented in a matrix that summarised students' technology diary records according to context and purpose of use. An example of this matrix can be found in Appendix K. The interviews also included some structured questions that further probed students' dispositions and beliefs about technology practices.

The final interview allowed the researcher to collect detailed data about students' practices, including their perspectives and beliefs that could not be captured in the technology diary or through other methods. The open-ended conversational approach of the interview altered the power balance of the interview, moving away from a structured interview controlled by the researcher to an informal discussion where the student participants offered their ideas. Through this approach, the student participants reconstructed details of their practices and explained the meanings that their experiences

held for them. This strategy allows the researcher "to gain unique insights" into why students choose "to act in certain ways in various situations" (Dempsey, 2010, p. 349).

Technology diary

The purpose of the technology diary was to document students' technology practices over a period of time. Specifically, it recorded what technologies they used, where and with whom they used them and the purpose of use. Appendix L presents a sample of sections within the technology diary that outlines its structure. The design of the technology diary allowed for its use as a stimulus for discussion in the subsequent final interview.

The technology diaries were event-based, the event being the use of technology. Event-based diaries require participants to create entries in the diary when engaged in the phenomenon under investigation (Bolger, et al., 2003). When the occurrence of the event may be frequent, diary methods can become time consuming and require a high level of participant commitment (Bolger, et al., 2003). To overcome this, the structure and layout of the diary were designed to allow participants to complete entries quickly, using check boxes, a table layout and short sentence responses.

Participants' diary records are an effective method when the study aims to collect data at the person-level (Bolger, et al., 2003). This was well suited to the aims of this study, which placed importance on the reconstruction of participant realities and contexts in data collection. Diary methods also "permit the examination of reported events and experiences in their natural, spontaneous context" (Bolger, et al., 2003, p. 580). In this study, the diary method allowed the researcher to collect data on participants' technology practices within their contexts over an extended period of time, which would be intrusive and onerous by other methods such as observation.

Diary methods increase data reliability in that they reduce the time elapsed between the phenomenon under investigation and the collection of data; in this case, the participant's recording the event. This, in turn, reduces the limitations associated with retrospection when participants recall past events (Bolger, et al., 2003). The use of the technology diary as a basis for conversation about students' technology practices addressed the

common data collection problem of recall accuracy when participants are interviewed about past phenomena (Fontana & Frey, 2000). Furthermore, the use of visual aids to stimulate recall (Greig, et al., 2007), including the technology diary and visual summaries of students' technology practices from the technology diary, incited discussion and insights into the underlying logic behind the practices.

Pilot study

A pilot study was conducted prior to the main study. The purpose of a pilot study is to trial, review and refine the data collection protocols and tools, with respect to both the content and procedures to be followed, to ensure the validity and quality of the study findings (Yin, 2009). In this pilot study the study protocols were tested in their entirety. The pilot study was conducted during the second school term of 2012 at a secondary school in the same regional Australian city as the two schools reported on in the main study. The pilot study involved one class case of 12 Year 10 students and their teacher, and three student case studies. The school was selected on the basis of convenience and access by the researcher (Creswell, 2007).

All participants involved in the pilot study were informed that they were participating in a pilot version of the study and that their involvement would be two-fold: they would participate in the data collection activities and help the researcher to review and refine the data collection tools and procedures. The data collection protocols were carried out in full, with some additional steps included to help the researcher review and refine the research methods.

Participant response and feedback on the data collection tools was sought through questioning and researcher note taking during and after data collection. Specifically, during Phase 1, when students were completing the questionnaire, the researcher invited students to ask about or comment on any items that seemed unclear or ambiguous. For example, some students asked questions to clarify the meaning of some of the technology devices included in the questionnaire. Additionally, during the interviews with students and teachers, the researcher rephrased questions and questioned the participants about the completion and usability of the technology diary. Based on participant responses, feedback and data analysis, minor refinements were made to the data collection tools and protocols. These included rewording questions in the

questionnaire and interviews, modifying the order of questions in the questionnaire and refining the categories of technology practices in the technology diary.

Prior to data collection, it was important that analysis was considered in the design of the research, to ensure the data was analysable (Yin, 2009). Therefore, preliminary data analysis was conducted on all data sources to establish the quality of the findings in light of the research questions. Preliminary data analysis comprised data management and the reading and memoing of all data sources to ensure that the themes that emerged were relevant to the research questions.

4.3.2 Data collection procedure

Ethical considerations

Prior to the start of the study, applications to conduct the research were submitted to the Human Research and Ethics Committee (HREC) at the University of Wollongong (UOW) (Appendix M) and the New South Wales Department of Education and Communities (NSW DEC) (Appendix N). Upon ethics approval from both HREC at UOW and NSW DEC, recruitment for the study commenced; this will be outlined in the following section.

All details of the research were transparent and disclosed to participants through verbal explanation by the researcher and detailed information sheets outlining the purpose, participant involvement in the study, ethical considerations, potential risks and benefits, confidentiality of the data and their right to non-participation or withdrawal at any time without penalty (Appendices O, P and Q contain the participant information sheets). Written informed consent was obtained from each teacher and student participant (Appendices R and S contain the participant consent forms). As the students in the study were under the age of 18, written informed consent was obtained from each participating students' parent or caregiver (Appendix T contains the parent/caregiver consent form). Teacher and student participants were reminded by the researcher at each stage of data collection of their right to withdraw from the research without repercussion or penalty.

When collecting data from children and young people under the age of 18 a number of ethical considerations must be made. The researcher took special care to ensure that all communications with student participants were in age-appropriate language so that students completely understood their participation in the research and thus made an informed choice to participate. This included verbal introductions by the researcher, written information sheets and consent forms (Appendices P and S), as well as the wording of all data collection instruments (Appendices E, G, L and I) and the usability of the questionnaire and technology diary data collection instruments (Appendices E and L). All interviews and conversations with students were conducted within school hours, on school grounds in open, yet private, locations, including meeting rooms within the library or vacant classrooms adjacent to the class and teacher. These ethical procedures also ensured that students felt safe and open to communicate with the researcher.

Participants' confidentiality was maintained throughout study. Hard copies of written consent forms, paper copies of the questionnaires, technology diaries and printed interview transcripts are being stored in a locked filing cabinet in the researchers' office for at least five years, after which they will be destroyed. Electronic data, including questionnaires and audio recordings, are stored on password-protected computers. Only the researcher has access to the data.

Participants' confidentiality was ensured through the analysis and reporting of the research findings. Identifying information from participating schools, teachers and students from all data sources was replaced with participant codes and/or pseudonyms prior to analysis. Pseudonyms were used in all reporting and presentation of findings.

Phase 1

Recruitment

One Year 9 class and one Year 10 class were recruited from two public secondary schools in a regional Australian city. The two participating schools were recruited based on the accessibility of their location to the researcher (within the selected regional city), willingness to participate in the research and variation in size and socio-economic data (Appendix U contains data on occupational categories from the schools and statistical

data for the area and Australia). Recruitment of the two school sites began in Term 2, 2012, when the principal of each school was invited to participate in the research through a letter of invitation (Appendix V). Pseudonyms for the names of the participating schools have been used throughout the thesis and reporting of the study to protect the privacy of participants.
Following the invitation, a meeting was held between the researcher and school principal of North High School at the end of Term 2; phone discussion was conducted with the principal of South High School at the beginning of Term 3. These discussions outlined the aims, research activities, criteria for teacher participants, impact upon teachers and students and the benefits of participating in the research.

The principals at both schools assigned an executive teacher to assist with recruiting teachers and their classes. The researcher contacted the executive teachers to arrange a meeting to discuss each school's participation in the study, following the same discussion items as the meeting with the school principal. Class cases were selected based on convenience sampling based on the following criteria:

- A Year 9 or 10 class, and
- The teachers were willing to take part in the research.

Through consultation with the executive teachers, two teachers from each school were identified as potential participants based on the criteria. This resulted in participating teachers who had an interest in technology, as either a frequent or a keen technology user, or interested in developing their use of technology for teaching and learning.

The executive teacher at North High School recommended two class teachers to participate in the study and facilitated the researcher's invitation by email. At South High School, the executive teacher facilitating recruitment volunteered herself and also suggested another staff member, facilitating the researcher's invitation through an informal introduction. Meetings were scheduled with each teacher participant to introduce the study, in which the research activities, impact upon teachers and students, benefits of participation and ethical considerations were discussed. Teachers were provided with participant information sheets, and written informed consent was obtained (Appendices O and R). Following this, the data collection timelines were

negotiated to commence in Term 3, 2012 and a time was scheduled to attend the teachers' classes to introduce the study to the students and invite them to participate.

The researcher visited each case class during class time with the teacher participant. The researcher provided an overview of the study, outlining its purpose, student participation, potential risks and benefits of participation, ethical considerations including the voluntary nature of participation and choice to participate in Phase 1 and Phase 2 of the study. Students were provided an opportunity to ask questions of the researcher. As the students were under the age of 18, informed consent was also required from their parents or caregivers. Students were provided with information sheets and consent forms in age-appropriate language (Appendices P and S) as well as information sheets and consent forms for their parent or caregiver (Appendices Q and T). The researcher returned to each class one week later to collect the written consent forms from students and their parent or caregiver.

Sites and participants

School sites

North High School had 608 students and South High School had 1198 students (Australian Curriculum Assessment and Reporting Authority [ACARA], 2013d). The two schools had an Index of Community Socio-Educational Advantage (ICSEA) value slightly lower than the Australian average (ACARA, 2013a). The ICSEA value is a measure of student educational advantage calculated based on students' family background data as well as the census and statistical data of the community (ACARA, 2013a).

The census data of the two communities indicated that the area of North High School had a higher median family income than South High School and the Australian median, although only around 77% of households were connected to the internet, compared with 80% of Australian households (ABS, 2011). The labour force of the northern area was above the Australian and regional averages for occupational categories requiring a higher skill levels or qualifications, including managers, professionals, technicians and trade workers and clerical and administrative workers (ABS, 2013a). In contrast, the area of South High School had a median family income below the Australian median and only 65% of households connected to the internet (ABS, 2011). The labour force of the southern area was above the regional and Australian averages for lower-skilled

occupations, including technicians and trade workers, community and personal care workers, sales workers, machinery operators and drivers and labourers (occupation classification data detailed in Appendix U).

The statistics of the two regions demonstrate that the northern area was characterised by a more professional work force with higher incomes, while the southern area was predominantly working class with lower incomes and fewer households connected to the internet.

Class cases

Figure 3 outlines the multiple embedded case study design, detailing each class and student case.

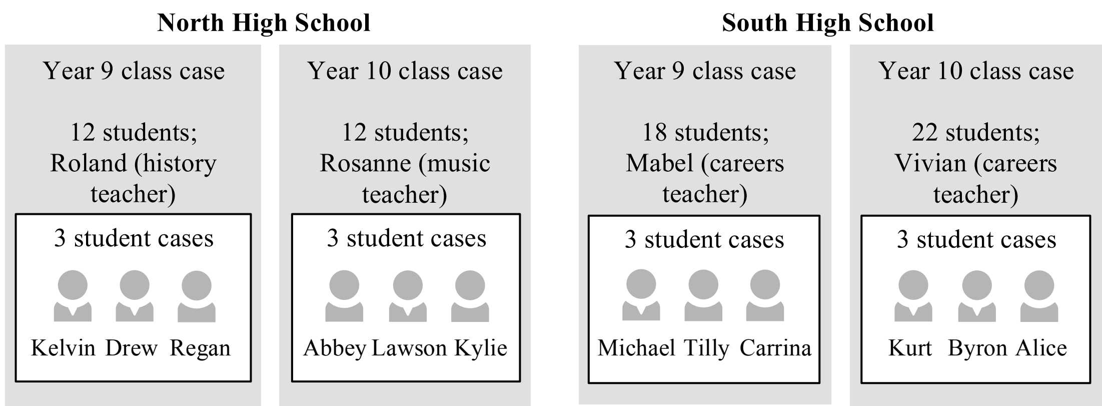

Figure 3 Multiple embedded case study design detailing class and student cases

The Year 9 class at North High School was a history class of 15 students, taught by Roland and another teacher on alternative days. The class was an elective subject, open to students from all academic ability levels. The classroom had a digital projector that Roland connected to his school-issued laptop for lessons. Roland was interested in learning more about effectively integrating technology in the classroom.

The Year 10 class at North High School was a music class of 19 students, taught by Rosanne. This class, too, was an elective subject open to students from all academic ability levels. The classroom had a digital projector that Rosanne connected to her

personal laptop for lessons. Rosanne had an interest in integrating technology in the classroom and used technologies frequently in her everyday life.

The Year 9 class at South High School was a careers advice class of 24 students, taught by the school librarian, Mabel. Students in this class were ability grouped according to their science class. The class was the third highest ability group within that year group. The careers class was taught in a computer lab where each student had access to a computer. Mabel was interested in learning more about technology practices for learning.

The Year 10 class at South High School was also a careers advice class of 28 students, taught by the careers adviser and school ICT coordinator, Vivian. Students in this class were ability grouped according to their science class. The class was the highest ability group from that year group. The classroom had a digital projector that connected to the teacher's school-issued laptop for lessons. Vivian, being the ICT coordinator, was interested in technology; she was a high technology user at school and in her everyday life, and was generally interested in the research.

This study specifically concerns itself with young people in Years 9 and 10 of secondary school, approximately 13-16 years old. When considering educational technology research, young people attending secondary schooling are a distinct group of learners from primary or tertiary students. This particular group of students is characterised by increasing independence and the development of an identity separate from their family, and thus by the importance to them of peer relationships (Davies & Eynon, 2013). For many young people technology is a part of these processes and experiences. Thus, as young peoples' networks of contacts spread, research too, including educational technology research, must consider practices across the various contexts in which young people engage with it (Hopkins, 2013).

Phase 1 data collection procedure

Questionnaire

The questionnaire was administered by the researcher and completed by all participating students during their regular class time with the participating teacher. The questionnaire took students up to 30 minutes to complete. Students were given the option to complete the questionnaire using an online tool by following a web address provided by the researcher or to complete a paper version of the questionnaire. The questions explored students' backgrounds, access to technology and technology practices in their everyday lives and at school (Appendix E).

Teacher interview

A one-on-one structured interview was conducted with each of the four class teachers after students had completed the questionnaire and before the second phase of the study (Figure 2). The interviews were conducted on school grounds in classrooms or meeting rooms and were approximately 45 minutes in duration. The interviews probed the teachers' use of technology for school related purposes, and their perspectives about the use of technology at school and about students' technology practices (Appendix D).

Phase 2

Recruitment

Student questionnaire data from Phase 1 of the study was analysed to select 12 student cases to be included in Phase 2. Three students from each class were purposefully selected using a maximum variation sampling method, based on the following criteria:

- They consented to participate in Phase 2 (Appendix S).
- They reported differing levels of access to and use of technology in the questionnaire. Student data was organised into high-, medium- and low-access categories and high-, medium- and low-frequency users, based on their questionnaire responses.
- They reported coming from varied family backgrounds determined by family structure (single parent or two parent family, number of siblings), parents' occupation (parent occupation classification), family technology use (high, medium or low users) and the range of purposes for which their family used technology (education, work, social and leisure).

The third and fourth criteria were developed to provide opportunity to explore variations in students' backgrounds, guided by the theory of practice (Bourdieu, 1977). Further detail of this preliminary data analysis is outlined in Section 4.4.1. As both classes had a small number of students complete the questionnaire and only a portion of those consented to participate in Phase 2, the researcher's ability to select students based on their backgrounds and technology practices was limited. For this reason, at the conclusion of the interview, the researcher and teacher discussed the sampling of student participants for the student cases to ensure that the selection of students represented a cross-section of the class based on their technology use and family background.

To begin Phase 2, the researcher approached each of the selected student cases during class time with an invitation to be part of the second phase of the study. Upon students' consent to participate in Phase 2 of the study, a time was arranged to conduct the initial semi-structured interview.

Participants

Phase 2 involved 12 student case studies. Table 5 provides an overview of the 12 student cases, including their pseudonym, school, grade and family structure, the occupation classification (ABS, 2013a) for parents with whom they lived and the technologies accessed in their homes, with those most frequently used marked with an asterisk. Table 5 presents data from the Phase 1 questionnaire. Pseudonyms are used throughout this thesis and all reporting of the study to protect participants' privacy.

Table 5 Overview of student cases

Name	*Year*	*School*	*Family structure*	*Parent occupation classification*	*Technologies access in the home*
Kelvin	9	North	Mother, father^, younger sister	Clerical and administrative, unknown^	Desktop, laptop, pre-paid internet, iPod, games console*
Drew	9	North	Mother, step-father, younger sister and brother	Clerical and administrative, Community and personal service	Desktop, internet*, iPod*, mobile phone, games console
Regan	9	North	Mother, step-father, younger sister and brother	Professional, Professional	Desktop*, laptop*, internet*, mobile phone (internet), iPad, iPod*, games console
Kylie	10	North	Mother, step-father, younger sister and brother	Unemployed, Manager	Desktop*, laptop, internet*, iPod* and mobile phone
Abbey	10	North	Mother, step-father, younger sister and brother	Unemployed, Manager	Laptop *, internet*, iPod*, games console
Lawson	10	North	Mother, father^, younger sister	Clerical and administrative, unknown^	Desktop*, laptop*, internet*, mobile phone*, iPod*, games console
Carrina	9	South	Mother, father, older sister, young brother	Unemployed, Technicians and trades	Desktop, laptop, internet*, iPad, iPod*, mobile phone (internet)*, games consoles
Michael	9	South	Mother, father, older sister, older brother	Professional, Professional	Desktop, laptop, internet*, iPod*, mobile phone, games console
Tilly	9	South	Mother, father^, two older sisters, younger sister and brother	Sales, unknown^	Internet*, iPod*, desktop, laptop, mobile phone, games console
Alice	10	South	Mother, father, older and younger sister	Clerical and administrative, Technicians and trades	Laptop, internet, mobile phone
Kurt	10	South	Mother, father, older sister	Unemployed, Machinery operators and driver	Desktop*, internet*, iPad*, iPod*, mobile phone (internet)*, games console*
Byron	10	South	Mother, father^, younger sister^	Community and personal service, unknown^	Desktop, laptop*, internet*, iPod*, mobile phone*, games console

Note: The questionnaire collected data on students' parents with whom they lived; ^lived separately, *technology used every day.

Phase 2 data collection procedure

Initial semi-structured interview

A one-on-one semi-structured interview was conducted with each of the 12 student case participants. The interviews were conducted during class time on school grounds. Interviews were arranged in negotiation between the researcher, student, and teachers. Care was taken to cause minimal disruption to student learning; therefore, where possible the interviews were scheduled during class time with the participating teacher or during students' free periods. The researcher followed a series of semi-structured questions and prompts, as outlined in the initial interview protocol (Appendix G).

Technology diary

At the conclusion of the initial interview the researcher provided student case participants with a technology diary. The researcher explained to each student how to use the diary and the kinds of practices to include, and students were given the opportunity to ask questions (Appendix L). Students recorded all technologies used in their everyday lives and at school in the diary over a two-week period commencing the day following the initial semi-structured interview. The researcher established that two weeks would be a suitable time frame, as students' school timetables were repeated on a fortnightly basis, thus collecting data from all students' classes. The time frame also produced sufficient data, but would not be overly onerous for the student participant. The researcher returned to the schools to collect the technology diaries upon students' completion. The technology diary data was analysed in preparation for the final semi-structured interview. This preliminary data analysis is detailed later in Section 4.4.1.

Final semi-structured interview

In consultation with the student, teachers and researcher, a schedule was devised to conduct the final interviews with students, following the same protocol as the initial interview. One-on-one, semi-structured interviews were conducted with the researcher and student case participants one to two weeks after students' completion of the technology diary to ensure that the events recorded were recent in students' memories.

The final semi-structured interviews were customised for each individual student case, based on the technology practices recorded in the technology diary. An example of the final semi-structured interview protocol is provided in Appendix I. Part of this interview involved referring to the technology diary and the researcher's initial data analysis matrix (Appendix K). The use of these stimuli in the interview served as a strategy to encourage discussion of technology practices, but also as a form of member checking, where students were able to clarify, add detail or correct records of their practices.

4.4 Data analysis

Qualitative data analysis involves an iterative process of data collection and analysis, where the two often occur simultaneously (Miles & Huberman, 1994). The data analysis approach of this study was guided by Creswell's data analysis spiral (Creswell, 2007). The data analysis spiral represents "the process of moving in analytical circles rather than using a fixed linear approach" (Creswell, 2007, p. 150). The strategies employed within the spiral include:

- *Managing data* so that it is organised in computer files and folders ready for data analysis.
- *Reading and memoing* to become immersed in the details of the data. Memoing involves writing notes alongside the data; for example, in the document margin. These notes comprise short phrases, ideas or concepts that occur to the researcher as they are reading.
- *Describing, classifying and interpreting* to describe the data in detail, develop themes through a classification system and make interpretations based on the literature and personal views. During this stage, coding frameworks may be developed (including information expected, unexpected, conceptually interesting or unusual).
- *Representing and visualising* where the data is presented in the form of text, tables or figures.

Additional to these strategies, this study also used the strategy of data reduction, in which the data is adapted into a manageable form through coding, chunking, quantifying or discarding data so that interpretations may be made (Miles & Huberman, 1994). In this study, the process of data reduction was conducted as the researcher read,

made memos and classified and interpreted the data, focusing on patterns or themes present in it. These included themes that aligned with the theoretical framework, as well as those that were unexpected or conceptually interesting or unusual. The process of data analysis began during data collection and preliminary analysis, with further analysis continuing after data collection. These stages of data collection will be outlined in the following section.

4.4.1 Preliminary analysis

Preliminary data analysis was conducted during data collection to manage the data collected and to inform subsequent data collection activities. During this stage the researcher may observe and record "emerging insights, hunches and tentative hypotheses" that may direct subsequent steps of data collection (Merriam, 1998, p.151). In this study, these emerging insights were recorded in the researcher's journal throughout the data collection process. Preliminary analysis of the data also included data management, reading and memoing, classifying, interpreting and visualising (Creswell, 2007). Table 6 provides a summary of the data analysis procedures according to the phases of the study.

Table 6 Summary of data analysis approach and procedures during data collection

Phase of study	*Analysis strategy*	*Analysis procedure*
Phase 1		
Questionnaire	Data management	• Create folders for each class case • Collate digital and paper questionnaire data in a spreadsheet
	Read and memo	• Read questionnaire responses – forming initial codes for closed and open questions noted in the spreadsheet (Table 7)
	Classify	• Establish patterns based on codes determined above to select 12 student case studies that represent maximum variation in the data based on the criteria in Table 7
Teacher interview	Data management	• Organise audio files and interview transcripts in case folders
Phase 2		
Initial interview	Data management	• Create folders for each student case; organise audio files and interview transcripts
Technology diary	Read and memo	• Summarise technology diary entries; organise data into a matrix for each student case
	Visualise	• Save technology diary matrixes in student case folders
	Interpret	• Summarise and note themes and patterns in the data using direct interpretation to develop interview questions for final interview
Final interview	Data management	• Organise audio files and interview transcripts in student case folders

As the data was collected in multiple forms over an extended period of time, it was important to organise and store the data as it was collected over the period of data collection as a preceding step to data analysis. Specifically, questionnaire data was exported from the online survey tool; paper questionnaires were entered manually and all records organised into an electronic spreadsheet. Interviews were audio recorded and transcribed into electronic Word documents in preparation for data analysis.

The researcher's journal along with preliminary analysis of the questionnaire data informed the sampling of student case studies. Similarly, the journal and preliminary analysis of the initial semi-structured interviews and technology diary informed the

development of questions for the final semi-structured interviews with students. The selection criteria used to sample the 12 student case studies was informed by the theory of practice (Bourdieu, 1977) to represent variation in students' backgrounds (Section 4.3.2 contains the selection criteria). Specifically, differing levels of access (objectified field structures and family economic capital), family structure (field), parent's occupations (economic and cultural capital) and students' and others' use of technologies in the home (habitus and field) were differentiated (outlined in further detail in Appendix F). Therefore the preliminary analysis of the questionnaire data focused on students' backgrounds, access to and use of technologies in their everyday lives. All questionnaire data was read, after which classifying codes were established based on the selection criteria (Table 7). The relevant questionnaire items were coded, followed by across-case analysis of students within each class case to select three students in each class who represented maximum variation according to the criteria.

Table 7 Initial data analysis memos applied to the student questionnaire data for student case sampling

Student case selection criteria	*Initial data analysis codes (Questionnaire item)*
Differing levels of access to and use of technology	High, medium and low access (item 2) High, medium and low frequency technology user (item 2)
Varied family backgrounds	Single parent family, two parent family, no siblings, siblings (item 1) Parents' occupation classification (item 1) Family high, medium and low technology use (items 3 and 7) Family technology use for work, education, social and leisure related purposes (item 7)
Student participant technology practices	Technology use for work, education, social, and leisure related purposes (item 5).

Note: Appendix F contains questionnaire item numbers.

The initial semi-structured interview data and technology diary data was also analysed during data collection to inform the development of questions for the final semi-structured interview. This involved visual representation of the technology diary records into a matrix, comparing each student's technology practices in the school and everyday life fields, and for education related and everyday life related purposes

(Appendix K gives an example of the initial analysis matrix). The matrix provided a visualisation of technology use patterns to be used as a stimulus in the final semi-structured interview. The patterns and themes within the matrix led to the development of questions such as “I also noticed that you only used technology during class time when you were at school – do you ever use technology at school for everyday stuff?” Each student’s technology practice records were also compared with data from their initial semi-structured interview to check for any inconsistencies in accounts. This allowed the researcher to ask clarifying questions during the interview, such as “Is there anything at school that you would usually do that perhaps you didn’t do over these two weeks?” This initial analysis also allowed the researcher to follow up on students’ technology practices that were unexpected or distinctive from other student cases through questioning in the final interview. For example, the following question probed one particular student’s use of email: “I found it really interesting that you contact your friends through Facebook but you also sent an email about a geography assignment. Can you tell me about why you chose email to communicate with your friend?”

4.4.2 Thematic and theoretical analysis

Further rigorous data analysis was conducted at the completion of data collection, in which multiple lines of analysis were conducted. The data analysis strategy relied on the theoretical propositions of the study, specifically the study’s theoretical framework for students’ technology practice, based on Bourdieu’s theory of practice (1977) (Table 4 in Chapter Three). Yin (2009) advises that theoretical propositions are extremely useful in guiding case study analysis, particularly when they involve exploring relationships between factors. Therefore, this approach was appropriate for this study as it explored relationships between physical, individual and social factors that shaped how and why students use technologies. The theoretical framing of the study shaped the research questions and guided the development of the data collection tools (Appendices D, G, I and L). It was therefore anticipated that these theoretical themes would emerge in the data. However, to ensure the credibility of the data analysis, the data was first analysed inductively to identify themes and patterns that emerged. Inductive data analysis is a process of data reduction through open coding (Creswell, 2007). Table 8 outlines the two approaches to analysis and details the data analysis strategy and procedures employed.

Table 8 Summary of data analysis approach and procedures after data collection

Line of analysis	*Analysis strategy*	*Analysis procedure*
Thematic analysis	Read and memo	• Read all data from each data source carefully, making memos alongside the data in the Word document (interviews) or spreadsheet (questionnaire data)
	Classify	• Develop thematic codes (Appendix W) and code interviews using QSR NVivo; code questionnaire data within the spreadsheet
Theoretical analysis	Read and memo	• Read all data from each data source again, considering the data, thematic coding framework and theory of practice
	Classify	• Develop a theoretical framework (Table 4) • Code interview and open-ended questionnaire items using the theoretical coding framework (Appendices W and X)
	Interpret and represent	• Compare the thematic and theoretical coding frameworks to establish alignment of themes (Appendix W) • Read and triangulate all data sources for each student case to make direct interpretations. Write student case summaries • Read and triangulate all data sources for each class case to make direct interpretations; write class case summaries • Read all analysis of each data source to make direct interpretations • Compare class cases to make interpretations about class technology practices • Compare student cases to make interpretations about student technology practices • Compare student cases to class cases to make interpretations about student technology practices

Thematic analysis

All data was first analysed inductively through a process of data reduction through open coding. For this study, each data source was analysed separately using methods appropriate to the data.

Data from the students' technology diaries were analysed separately. The diary records comprised closed items; they were analysed by first organising the data into matrixes by calculating frequency of technology practices, purpose of use and location (Appendix K). This allowed the researcher to create detailed case descriptions of the patterns in each student case's technology practices. The themes and patterns that emerged from the technologies were further explored and analysed through the final semi-structured interview data.

Teacher and student interview transcripts were read multiple times throughout the coding process. Firstly, the researcher read through the interview transcripts, making notes or memos in the margins of the transcripts. Through categorical aggregation, these memos were reviewed with across-case analysis to establish common themes and patterns and developed into codes (Stake, 1995). Through a cyclic process of reading, refining and rereading the interview transcripts, definitions for codes were developed and refined (Appendix X contains codes and definitions). Following this, the interview transcripts were imported into the data analysis software tool QSR NVivo for coding using the developed coding framework.

The coding framework was applied to the open-ended items in the questionnaire data. The same coding framework was used for this data as for the interview transcripts, as both centred upon the research questions and the framework was thus applicable to both. The use of the same coding framework also allowed for triangulation across data sources. The codes were applied within the electronic spreadsheet for analysis. Closed items within the questionnaire were summarised in tables and represented using graphs for analysis.

The coding framework was then considered alongside the theoretical framework of the study. Many themes that emerged from the data aligned with aspects of the theoretical

framework. Table 9 is an example of the alignment of the coding and theoretical frameworks for the theoretical construct of habitus (Appendix W). While many of the codes and theoretical concepts aligned, a small number of codes did not naturally align with the theoretical framework, as they were not directly related to the research questions, but were emergent issues. Additionally, a small number of concepts from the theoretical framework had not emerged during the thematic analysis; codes were assigned to these concepts after the thematic analysis.

Table 9 Alignment of thematic and theoretical codes for the theoretical construct of habitus

Thematic codes	*Theoretical codes*
• School experiences with technology • Past experiences with technology • Learning new technologies	• Past and present experiences with/without technology
• Thoughts about technology for learning • Self perception as a technology user • Typing vs. pen and paper • Technology as an interest	• Disposition toward technology
• Parents' perceptions of technology • Value of technologies	• Own and others' beliefs and perceptions about the perceived value of technologies
• Parents' technology practices • Siblings' technology practices	• Own and others' beliefs and perceptions • Socialisation into technology practices

Theoretical analysis

The researcher used the guiding theoretical framework of Bourdieu's constructs of field, habitus and capital to form another line of selective coding of the data. To do this, the researcher analysed the data with consideration of participants' technology practices and perspectives as they related to Bourdieu's concepts. As outlined in Chapter Three, a literature review and deductive analysis led the researcher to conceptualise Bourdieu's theoretical constructs in relation to technology specific practices. Table 4 in Chapter Three presents Bourdieu's concepts manifest through the technology related practices, perceptions and circumstances present in the data.

This analysis and conceptualisation (Table 4 in Chapter Three) formed the second line of coding. Many of the codes in the thematic and theoretical coding frameworks aligned, as outlined in Appendix W. Through consideration of the two complementary coding frameworks, definitions of the theoretical codes were further refined, after which the second line of analysis was coded using the data analysis software tool QSR NVivo. Appendix X specifies the code definitions and provides examples of coded data taken from the student interview data.

Yin (2009) describes using the theoretical propositions of the study as a powerful strategy for data analysis. This was particularly so for this study, as the aggregation of the thematic and theoretical coding allowed the researcher to inductively generate generalisations, and at the same time strengthen the validity of those of generalisations and extend analysis toward explanation rather than description of the phenomenon.

Once all data sources had been organised, coded and tabulated, within-case and across-case data analysis was conducted. Specifically, class case data was analysed alongside data from teacher interviews to create class descriptions, and all data sources for each student participant were triangulated and analysed to create student case descriptions. Across-case analysis involved comparison of class cases, teacher cases and student cases to highlight patterns and disparities. From the in-case and across-case data analysis naturalistic generalisations were formed with the guidance of Bourdieu's theory of practice (as presented in the following chapters).

The findings of this study are reported in the following four chapters. Each chapter is written in journal article format and is either published or prepared for publication. The focus of each chapter was shaped by the research questions of the study; specifically, Chapters Five and Six characterise students' technology practices in their everyday lives and at school (research question one), and Chapters Seven and Eight explore how and why students use technologies (research questions two and three). The sequence of the subsequent chapters also develops in level of abstraction from thematic to theoretical analysis and discussion. Yin (2009) describes this process as theory-building, where the findings are reported in a sequence that reveals "a new part of the theoretical argument being made" (p.154). More specifically, the focus of the following chapters begins with

presentation of findings at the thematic level, moving toward discussion of field analysis and exploration of theoretical constructs of habitus, capital and doxa in the later chapters.

4.5 Quality of the study

The quality of research findings is enhanced through the development of detailed case study protocols (Yin, 2009), as outlined throughout this chapter. This was supported throughout the data collection phases by the researcher's journal, in which the researcher routinely recorded all data collection activities, initial and emergent impressions, thoughts and observations.

To enhance the integrity and quality of the research findings, a number of strategies commonly adopted in qualitative research were employed as follows:

- The study involved engagement in the school field over a 10-week period, where the researcher made numerous school visits (18-20 visits to each school, each visit approximately 30-90 minutes in duration), to speak with school executives, teachers and students in class and collect data, allowing the researcher to build trust with participants and check for misinformation (Creswell, 2007).
- Triangulation of multiple data sources, including questionnaire and teacher interview data for class cases, and questionnaire, interview and diary records for student cases. Triangulation of data sources allowed the researcher to confirm emerging findings (Yin, 2009).
- Member checking involves cross checking the reliability of the data and allowing participants to make necessary amendments (Miles & Huberman, 1994). In this study, students' diary records were used as a stimulus for the final interview, which allowed the researcher to cross check the reliability of the student case data and provided the opportunity for students to make amendments.
- Regular peer review or debriefing with research supervisors, who are experts in the field of educational technology, was conducted on a regular basis. Peer debriefing provided external checks and critical review of methods, processes and findings (Lincoln & Guba, 1985).
- Reflexivity is a process of acknowledgment and reflection on the researcher's biases and place in the research process (Denzin & Lincoln, 2011). In an attempt to

maintain participant objectivation, the researcher's biases were discussed with colleagues during research meetings and critically reflected on by the researcher in the analysis and reporting of the findings. Critical reflection provided opportunities to consider and refine the objectivity of researchers' interpretations and reporting of the study findings.

The reflexivity fostered by participant objectivation, outlined earlier in this chapter, is not a narcissistic endeavour that precedes empirical work. Reflexivity is crucial to qualitative research, as the researcher's bias and human subjectivity threaten the internal validity of the research findings (Bourdieu, 2003). Thus, reflection on the researcher's biases was considered through the research design and methods. Data analysis was also a reflexive process, as it is essentially an act of legitimation of structures, systems and practices (Bourdieu & Wacquant, 1992). The procedure of data analysis, often not explicitly disclosed in reporting of findings, is a perilous stage of the research, particularly when working with Bourdieu's sociology, in which the researchers' bias and innate human subjectivity threaten the credibility of the research findings. To address this challenge, this chapter has presented the researcher's biases, research design justifications and details of the data collection and analysis protocols.

Qualitative research is "concerned with the extent to which the findings of one study can be applied to other situations" (Merriam, 1998, p. 207), and thus was an important consideration in the reporting of the research findings presented in Chapters Five to Eight. This was achieved through providing detailed descriptions of the two research sites and uncontested presentation of the research findings to allow the audience to make informed generalisations.

4.6 Summary of the chapter

This study adopted a qualitative multiple embedded case study design in which to collect detailed accounts of students' technology practices with consideration of context. Informed by a review of current literature and the guiding sociological framework of Bourdieu's theory of practice, the study design was carefully considered to ensure the following principles:

- Collection of multiple data sources to produce rich description and reliable data of student practice
- Consideration of practice within context, elucidating students' experiences, circumstances, other field participants and the field structures
- Collection of data through the subjective worldview of the participants.

This research design was developed with the aim of generating rich data that described and, more importantly, illuminated the underlying logic of students' technology practices. Overall, with the aim of contributing to a more comprehensive understanding of not only what technologies students use, but why and how they choose to engage with technology.

CHAPTER FIVE

Tech savvy students? What do students do with technology in their everyday lives and the implications for technology use in school

Foreword

This paper is prepared for publication as **Beckman, K.,** Bennett, S. & Lockyer, L. 'Tech savvy students? What do students do with technology in their everyday lives and the implications for technology use in school' in the *Australian Journal of Education*. The *Australian Journal of Education* focuses on research related to education and schooling, particularly by and for an Australian audience. Therefore, this journal was deemed an appropriate avenue for publication as it attracts an audience of educational researchers and educators interested in issues of contemporary concern in education. This paper was written in a concise format (following the journal guideline of 6000 words) with a practical focus, making it relevant for researchers and educators alike.

This chapter of the thesis focuses on addressing the first research question, characterising students' technology practices in their everyday lives, while Chapter Six will characterise their uses at school. The paper reports on findings regarding students' everyday life practices based on the student data from Phases 1 and 2 of the study, including questionnaire data from the 64 students within the four class cases and interview and technology diary records from the 12 student cases.

This paper discusses students' technology practices in their everyday lives at a thematic level and does not employ Bourdieu's theory of practice. This decision was made for a number of reasons. First, the practical focus and target audience of the paper facilitated a thematic discussion relevant to the *Australian Journal of Education* audience. Second, the conciseness of this paper meant that presenting the findings in rich detail and providing clear explanations of the theoretical constructs and analysis would be problematic. Instead, this paper demonstrates the first line of thematic analysis, while Chapters Seven, Eight and Nine will elaborate on these themes on a theoretical level.

5.1 Abstract

As technologies become increasingly prevalent in society, the primary site for students' technology use is the home. However, within the Australian context there is a lack of empirical research that investigates students' practices with technology in their everyday lives. The study reported on in this paper used a multiple embedded case study design to investigate secondary school students' technology practices in their everyday life and school contexts. This paper presents the characteristics of 13- to 16-year-old students' technology practices in their everyday lives. The findings depict students' technology practices as varied based on personal interests, disposition and circumstances, and often routine and rudimentary practices. This varied use of technology in their everyday lives suggests that students' skills, knowledge and experiences with technologies will also be varied. These variations have implications for the ways students engage with technologies and learning at school. This paper proposes an approach to teaching and learning that considers students' heterogeneous technology practices to inform teaching and learning experiences at school.

5.2 Introduction

"Digital natives" (Prensky, 2001), the "net generation" (Tapscott, 1998) and "millennials" (Howe & Strauss, 2009) are popular terms used to characterise a generation that has grown up in a world immersed in technology (generally born after 1980). These notions have gained much momentum in the media and society, fuelling claims of a generation of learners who have developed technological skills and knowledge through exposure to technologies and a distinct learning style that challenges traditional education. This, in turn, has led to calls for educational reform to cater to these digital learners.

Critical evaluation of the notion of a distinct group of tech savvy learners has prompted a movement of empirical research investigating this phenomenon (Bennett, et al., 2008). Empirical evidence of tertiary students, upon which much of the research has centred, has demonstrated that they are not a homogenous group of technology users; but rather, they possess varied skills, knowledge, practices and dispositions for technology use (Corrin, Bennett, & Lockyer, 2013; Kennedy, Judd, Dalgarno, & Waycott, 2010;

Margaryan, Littlejohn, & Vojt, 2011). These findings were echoed in a small number of studies of younger learners (Hinostroza, et al., 2011; Sánchez, et al., 2011; Smith, et al., 2013). For example, one study of 1056 Italian students, aged 14-16 years old, used a questionnaire to investigate students' digital competence (Calvani, et al., 2012). The questionnaire categorised skill levels of digital competence ranging from practical to higher order competencies. The study concluded that students' skills and knowledge were varied, but generally less skilled than popular notions suggest. While most students were competent with practical skills, including basic troubleshooting and knowledge of computer menus and commands, many students did not possess higher order cognitive or socio-ethical skills with technology. The large-scale study of children's use of the internet at home, *EU Kids Online*, found only 1 in 5 children aged 9-16 years old employed such skills to create content online (Livingstone, Haddon, Görzig & Ólafsson, 2011). Evidence from these studies demonstrates that while some students are highly skilled technology users, many lack particular skills and knowledge that may be associated with formal learning.

If indeed students' technological skills, knowledge and practices are more diverse than suggested by generational notions, the challenge for researchers is to understand these variations in students' practices. Students' homes are a significant site of technology use and development of skills and knowledge (Davies & Eynon, 2013; Harris, et al., 2013). Thus, students' home contexts have become a site for research that seeks to understand students' practices with technologies to inform teaching and learning. Considerable research on students' home practices has been conducted (Livingstone, et.al., 2011; Madden, Lenhart, Duggan, Cortesi & Gasser, 2013), including the *ScreenPlay* project (Facer, Furlong, Furlong, & Sutherland, 2003), a longitudinal study that explored students' technology practices within the homes of 855 families across the UK. This large-scale study gave rise to a number of more recent studies that developed typologies of technology users as a means to understand student practices (Eynon & Malmberg, 2011; Luckin, et al., 2009). These studies offer a valuable description of students' practices outside of school, further emphasising the diversity of students' homes and technology practices.

In the Australian context, most of the research into primary and secondary school aged students' home technology practices dates back nearly a decade (Downes, 2002;

Sutherland-Smith, et al., 2003). Since then there have been considerable technological changes in society and education. Computer access in the home has become increasingly widespread (Australian Bureau of Statistics [ABS], 2011). However, the deficit of current research of students' practices at home or in their everyday lives means that there is much that is not understood about Australian students' technology practices. An understanding of students' technology use in their everyday lives may better inform the use of technologies in schools. In fact, research suggests that students' technology skills and knowledge that they develop through technology practices in their everyday lives has flow-on effects to their technology use at school and educational achievement in other areas of the curriculum (Organisation for Economic Co-operation and Development [OECD], 2009). This is of increasing significance considering the increased prominence of technology use in schools over the past decade.

Australian secondary schools saw a significant influx of technologies with the *Digital Education Revolution* (New South Wales Department of Education and Communities [NSW DEC], 2012). From 2009 to 2013 the *Digital Education Revolution* equipped schools with fast, reliable internet connections and technology devices. Part of this included providing students from Years 9-12 with their own specialised laptop computers. This change was intended to encourage everyday use of technology both at school and at home to transform teaching and learning (NSW DEC, 2012). More recently, the Australian curriculum has placed increased emphasis on learning with and about technologies, outlining technology skills and knowledge as general capabilities to be achieved by all students and the introduction of mandatory technology subjects from 2016 (Australian Curriculum Assessment and Reporting Authority [ACARA], 2013c). The Australian curriculum outlines that students are expected to engage in a range of technological capabilities both at school and outside of school, and have the ability to transfer these skills and knowledge "across environments and applications" (ACARA, 2013c). Despite a growing body of research that debunks the notion of a distinct generation of technologically savvy students (Bennett, et al., 2008), the ACARA statement suggests an assumption that students engage in technological skills, knowledge and practices outside of school that have relevance for learning at school (ACARA, 2013c).

Changes in the technology landscape in Australian schools acknowledge the importance of students' technology practices at home. This is demonstrated through increased access and potential use at home afforded by students' specialised laptops and emphasis on the development of technological skills and knowledge outside of school. Changes to infrastructure and curriculum suggest that schools see a need to connect with students' technology practices in their everyday lives, specifically informal learning practices that might be applied in the school context. However, there is a deficit of current research that explains how Australian secondary school students use technologies outside of school; thus there is a need for more current empirical research that investigates students' technology practices in their everyday lives.

The research reported on in this paper draws from a study that investigated students' technology practices at school and in their everyday lives. This paper focuses on findings about students' technology practices in their everyday lives and considers the implications for learning with technologies at school. Specifically, we ask, what are the characteristics of students' technology practices in their everyday lives? Are they performing a range of technological competencies outside of school? And ultimately, what are the implications for learning in the school context?

5.3 Methodology

The purpose of this study was to investigate secondary school students' technology practices according to context; specifically, in their everyday lives and at school. The study explores students' technology practices, which are conceptualised as more than use of a technology. In this study, the term "technology practice" is used to refer to the use as well as encompass the social and cultural meaning the use has in the individual's life.

The findings reported in this paper are drawn from a multiple embedded case study of students in Years 9 and 10 (aged approximately 13-16 years) and their teachers from two Australian public secondary schools. This type of case study research design allows for the investigation of the phenomenon with consideration of context (Yin, 2009). The multiple embedded case study design, comprising four class cases (64 students and four teachers) and 12 student cases, allowed for a broad investigation of practices across

class cases and in-depth exploration of student practices in the student cases. The two schools were in the north and south of a regional city where the socio-economic status of families was slightly lower than the Australian average. Regional data indicated that the median family income of both areas was close to average, with lower than average household internet connectivity (ABS, 2011).

This paper reports on student data from the class and student cases of the study, presenting data on students' technology practices in their everyday lives. The study involved two phases, as illustrated in Figure 2.

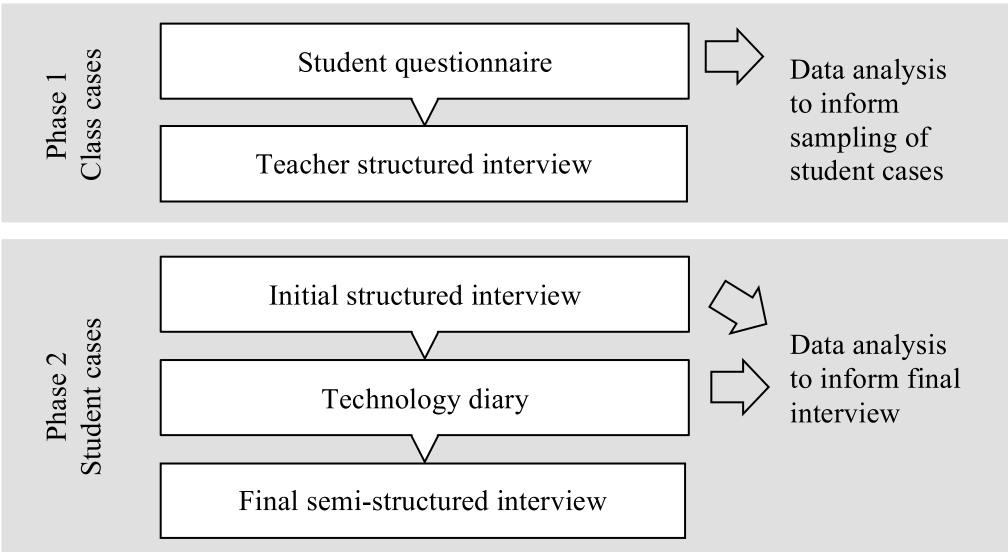

Figure 2 Study phases outlining data collection and initial data analysis

The first phase of the study comprised four class cases: one Year 9 and Year 10 class case from each school. The four classes were recruited based on convenience sampling (teacher volunteering), the year level taught and the teachers' interest in technology, either as frequent or keen technology users or as interested in developing their use of technology for teaching and learning. A questionnaire, including closed and open-ended items, collected data about students' backgrounds, access to technology at home and details of students' and their family's technology practices. A one-on-one teacher interview explored school technology practices and teachers' perceptions of students' dispositions and capability with technologies. The second phase of the study aimed to generate depth of understanding of students' practices. To do this, three students were selected from each class case; these comprised the student cases. The 12 student cases

were selected through purposeful maximum variation sampling (Merriam, 1998), based on the questionnaire data, with the aim being to include variation in students' family backgrounds, access, use and perceptions of technology. To generate rich descriptions of students' technology practices, multiple data sources were collected for the student cases. This involved an initial interview exploring students' technology practices and experiences, after which students detailed all technologies used over a two-week period in a technology diary, and a final interview, which used students' practices from the diary as a stimulus for discussion. Data from all sources, including the descriptive statistics from the questionnaire data, were analysed through categorical aggregation to establish themes and patterns. Established themes and patterns formed a coding framework with which each data source was analysed.

This paper reports on findings of students' everyday life practices from the student data from both phases of the study, including questionnaire data from 64 students within the four class cases, and interview and technology diary records from the 12 student cases.

5.4 Findings

5.4.1 Access to technology in everyday life

Students had varying access to a range of technology devices in the home. A closed item from the questionnaire asked students to indicate their access and frequency of use of particular technology devices (Figure 4).

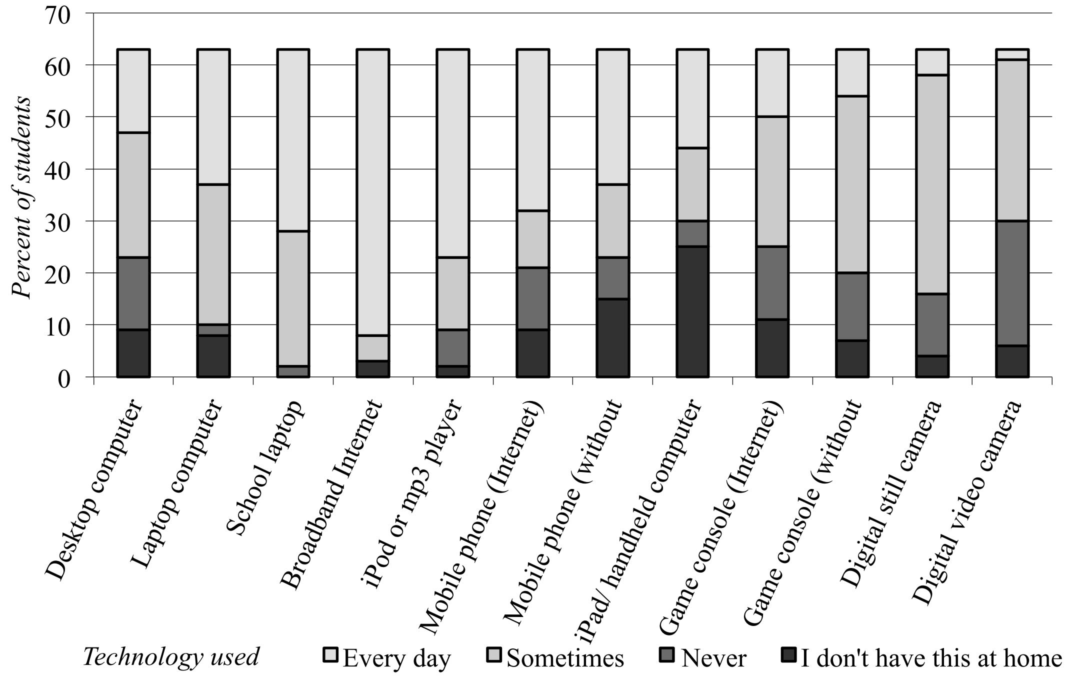

Figure 4 Frequency of technologies used by students in their homes

All students had access to a school-issued laptop at home as well as access to a laptop or desktop computer. The most frequently used technology was the internet: 60 from 64 (94%) of students had access to broadband connection at home and 55 from 64 (86%) of students reported daily use. However, three students did not have access to broadband internet at home; one of these students accessing the internet using a pre-paid connection. Use of mobile devices was frequent, with students using mobile technologies (including iPods/mp3 players, school-issued laptops and mobile phones, all with internet access) more frequently than desktop computers.

Interview data added detail to these findings, highlighting some of the more subtle aspects of students' access to technology. While most students reported having access to the internet, two students described their online practices being restricted by internet download limits. The quality of technology devices also influenced students' practices, with three of the 12 case students reporting access to desktop computers, but not using them due to the devices being out-of-date or broken, as Michael described: "It's really old, it's really slow" (Year 9, South High School, Initial interview). Additionally, sharing or the distribution of access to technologies between family members limited the time available to four of the case student cases' practices. However, half of the

student cases indicated they held priority over their parents and younger siblings in accessing technologies. For example, Kylie described her parents' use of the family computer: "They’ve only started recently going on it. They can send the basic email and I had to teach them how to do that" (North High School, Initial interview).

The importance of having constant access to devices providing internet access was a common theme in the open questionnaire items and interviews. Approximately half (55%) of students from the class cases described the internet as a means of being connected to social networks and information sources. For example, two students described: “It’s just connection to the world; I’m just always am on it” (Year 10 student, North High School, Final interview); and “My iPhone, because…I text 24/7 and it has FB [Facebook] on it and…it's always in my hand or pocket” (Year 10 student, South High School, Questionnaire). Similarly, students described the importance of accessing information online “to connect to endless resources of information” (Year 9 student, North High School, Questionnaire). Students described, through open-ended questionnaire items, accessing information relating to education, employment, social networks, news and interest related topics in their everyday lives.

5.4.2 Technology practices in everyday life

Responses to open items within the questionnaire indicated that students engaged in a range of technology practices in their everyday lives. Five technology use categories were established in analysis of the data by observing common themes in the purpose of students’ technology uses: inquiry, creation, communication, entertainment and management. Table 10 presents the categories and specific uses reported in the questionnaire.

Table 10 Students' technology uses in everyday life

	North High School				*South High School*				*All students*	
Category	*Year 9*		*Year 10*		*Year 9*		*Year 10*			
Use	*n.*	*%*	*n.*	*%*	*n.*	*%*	*n.*	*%*	*n.*	*%*
Inquiry										
Research	1	9%	6	50%	3	17%	13	59%	23	37%
Internet browsing	2	18%	5	42%	2	11%	12	55%	21	33%
Online dictionary	0	0%	1	8%	0	0%	1	5%	2	3%
Total	2	18%	9	75%	5	28%	19	86%	35	56%
Creation										
Homework/ assignments	3	27%	7	58%	3	17%	14	64%	33	52%
Presentations	0	0%	0	0%	1	6%	1	5%	2	3%
Taking photos	0	0%	1	8%	4	22%	2	9%	7	11%
Story writing	0	0%	1	8%	0	0%	0	0%	1	2%
Total	3	27%	7	58%	5	28%	13	59%	28	44%
Communication										
Social networking	4	36%	8	67%	9	50%	13	59%	34	54%
Phone calls/SMS	2	18%	3	25%	9	50%	13	59%	27	43%
Email	1	9%	3	25%	2	11%	6	27%	11	17%
Skype	0	0%	0	0%	1	6%	1	15%	2	3%
Total	5	42%	9	75%	11	61%	17	77%	42	67%
Entertainment										
Playing games	2	18%	4	33%	5	28%	12	55%	23	37%
Watching videos	3	27%	4	33%	6	33%	9	41%	22	35%
Listening to music	2	18%	2	17%	8	44%	9	41%	21	33%
Downloading music	1	9%	0	0%	0	0%	1	5%	2	3%
Reading e-books	0	0%	0	0%	0	0%	1	5%	1	2%
Total	4	36%	10	83%	14	78%	16	73%	44	70%
Management										
Timetable app	0	0%	0	0%	0	0%	1	5%	1	2%
Time/alarm	0	0%	2	17%	0	0%	2	9%	4	6%
GPS	0	0%	0	0%	0	0%	1	5%	1	2%
Total	0	0%	2	17%	0	0%	3	14%	5	8%

This table shows that students most often engaged in communication and entertainment uses associated with everyday life uses of technology outside of school, and around half of students used technology for inquiry and creation uses for school related purposes. The table also demonstrates a range of technology uses within each category of use. For

example, while two thirds of students used technology to communicate, their selection and nature of use were varied, with some students using online video calls through Skype, some using email and others social networking. Each of these forms of communications requires different skills and knowledge may involve varied forms of communication (i.e. an email is distinct from a message or post on a social networking site such as Facebook). Similarly, students' engagement in entertainment technology uses varied broadly from listening to music on an iPod, to playing multiplayer online games with friends while simultaneously strategising over Skype.

The patterns of use evidenced in the technology diaries kept by the student cases add further detail. Table 11 provides a summary of the frequency of technology uses recorded in students' technology diaries over a two-week period. Three student cases reported performing the same activities every day of the week before and after school, supplemented with additional technology uses; for example, Lawson accessed Facebook and YouTube every morning and Facebook every day when he arrived home from school (Year 10 student, North High School, Technology diary). Five students performed very similar practices every day, engaging in similar activities more than 70% of the time recorded; another student detailed the same technology practices every morning, but varied practices in the afternoon. Conversely, three students' practices did not follow a particular pattern. The student cases elaborated on their habitual technology practices during interviews. For example, Regan described her morning and afternoon routine:

> I have my iPod all the time with me, basically, so when I wake up and I'm getting ready, I just check my emails and my Twitter app. And then when I get home it's like the first thing I do, pretty much, when I get home from school, and it's become like a routine, I guess. (Regan, Year 9 student, North High School, Final interview)

Table 11 Technologies accessed and used by student cases outside of school over a two-week period

Name	*Technologies accessed at home*	*Technologies used outside of school over a two-week period*
Kelvin	Desktop, laptop, pre-paid internet, iPod, games console	*Everyday*: play games console *Most days*: interest driven internet browsing *Sometimes/rarely*: listens to music, unspecified homework
Drew	Desktop, internet, iPod, mobile phone, games console	*Everyday*: social networking (Facebook, Instagram), text messaging, listens to music *Most days*: phone calls *Sometimes/rarely*: unspecified homework
Regan	Desktop, laptop, internet, mobile phone (internet), iPad, iPod, games console	*Everyday*: social networking (Twitter) *Most days*: email, text messaging, watching YouTube, interest driven internet browsing, online inquiry and word processing for homework
Kylie	Desktop, laptop, internet, iPod and mobile phone	*Everyday*: sets alarm on phone *Most days*: social networking (Facebook, Instagram, Pinterest), text messaging, online inquiry and word processing for homework, listens to music *Sometimes/rarely*: download music
Abbey	Laptop , internet, iPod, games console	*Everyday*: social networking (Facebook, Instagram, Tumblr, Reddit), sets alarm on phone, listens to music *Most days*: online inquiry and word processing for homework, video camera *Sometimes/rarely*: email, create a note on phone
Lawson	Desktop, laptop, internet, mobile phone, iPod, games console	*Everyday*: social networking (Facebook, Tumblr), YouTube, text messaging and calls, sets alarm on phone, listens to music *Most days*: plays games online, online inquiry and word processing for homework
Carina	Desktop, laptop, internet, iPad, iPod, mobile phone (internet), games consoles	*Everyday*: listens to music *Most days*: email, plays games, chat rooms, text messaging and calls *Sometimes/rarely*: word processing (not related to school), unspecified homework
Michael	Desktop, laptop, internet, iPod, mobile phone, games console	*Everyday*: listen to music, texts messaging and calls *Most days*: Skype, play games, unspecified homework
Tilly	Internet, iPod, desktop, laptop, mobile phone, games console	*Everyday*: Text messaging *Most days*: social networking (Facebook), listens to music, unspecified homework
Alice	Laptop, internet, mobile phone	*Most days*: online inquiry and word processing for homework, social networking *Sometimes/rarely*: watches educational videos online, plays games online
Kurt	Desktop, internet, iPad, iPod, mobile phone (internet), games console*	*Everyday*: Skype, plays games on console *Most days*: online inquiry and word processing for homework, text messaging, YouTube, listens to music, plays games online
Byron	Desktop, laptop, internet, iPod, mobile phone, games console	*Everyday*: app to manage school timetable *Most days*: social networking (Facebook), email, interest driven internet browsing, online inquiry and word processing for homework

While students reported using a range of technologies, discussion with students through interviews revealed that a majority of students' technology practices involved relatively rudimentary functions of the applications. For example, students reported frequent use of social networking sites, an application with potential for user contribution through comments and uploading digital content. However, four of the 10 student cases reported that their use of social networking comprised "just reading" (Alice, Year 10 student, South High School, Initial interview). Another student explained how he didn't understand how to create a YouTube account, which restricted his ability to perform more advanced functions, such as subscribe to users and comment on or upload videos: "I don't have an account yet because I don't understand how to do it" (Michael, Year 9 student, South High School, Final interview). Students also described relatively basic skills when conducting internet inquiry, a practice frequently used for educational purposes. For example, one student described her use of Wikipedia: "It's not the most legit kind of site but, I don't know, it has information that's easier to read and it's got chapters almost so you can just scroll down and grab notes" (Regan, Year 9, North High School, Final interview). This is not to say that these kinds of uses are not of value, but does raise questions about students' technological skills and knowledge and generational notions of their sophisticated technology practices.

This is not to say that all students' technology uses involved rudimentary functions of the applications. Half of the student cases used more interactive applications that may have required higher levels of critical evaluation, creativity and problem solving. Two student cases used Skype to chat with friends while playing online games together. Another three students participated in social blogs (Pinterest and Tumblr), and one student participated in online networks through YouTube, Twitter and international online pen-friend networks. However, these practices were not frequent, nor were they widespread among the student or class cases. These uses of technologies indicate that students' practices were personalised based on their individual interests.

5.5 Discussion

The findings presented in this paper illustrate students' heterogeneous technology practices. Evidence suggested that student technology practices were characterised by generally routine and often involving rudimentary functions of technology applications.

Many students used technology applications' most basic functions, and used them routinely each day. Findings from the class and student cases also depicted students' technology practices as varied and based on personal interests, dispositions and circumstances. Comparison of students' technology practices in their everyday lives indicated they used a range of technologies for a range of purposes, both academic and for entertainment or leisure, based on their personal interests.

Indeed some common practices were shared among students, such as a preference to use technology for socialising or entertainment. Perhaps it is not surprising that this findings supports that of a number of survey studies that also report students' most commonly use technologies for socialising and entertainment outside of school (Hinostroza, Matamala, Labbe, Claro, & Cabello, 2015; (Livingstone, et.al., 2011; Macpherson, 2013; Madden, et.al., 2013). However, detailed accounts acquired through open questionnaire items and the student cases in the literature (Gurung & Rutledge, 2014) and in this study have revealed that the ways in which students engage in technology practices are varied and personalised.

While the practices of the students in the current study were largely personal, detailed data about their specific practices demonstrated some common characteristics. Overall, commonalities such as the rudimentary level and habitual nature of students' technology practices were observed. While the technologies used were different, the relatively low level of thinking and habitual use across technologies further demonstrated the rudimentary nature of students' technology practices. As students routinely checked social networking sites or scrolled through applications while eating breakfast or a snack, their engagement was passive. Thus suggesting the level of technological skills and knowledge employed while engaging in these activities was basic. Only a small number of students infrequently engaged in practices that may require higher levels of thinking such as critical thinking, evaluation or problem solving. While young people use technologies that allow for participation and contribution, most students do not create or upload content (Livingstone, et.al, 2011). This finding is similar to those from a study of over 1000 Italian teenagers that indicated that many students possessed only a basic level technological skills and knowledge (Calvani, et al., 2012).

Perhaps more significant were the technology practices not reported in these findings. The findings of this study contribute to a growing body of research providing evidence that disputes the common assumption that student technology practices may be characterised as ubiquitous, intuitive and sophisticated (ACARA, 2013d). The findings of this study show that a small number of students reported technology practices that may require sophisticated levels of thinking. Moreover, these uses were infrequently used by each student and not widespread among students in the study. Specifically, this finding is an important contribution to the Australian context, for which there is little recent empirical research that characterises Australian secondary students' technology practices.

On a more practical level, students in this study performed few activities in their everyday lives that align with formal education. Tasks such as "creating multimedia information products, analysing data, designing solutions to problems, controlling processes and devices, and supporting computation" (ACARA, 2013c, p. 57), stated as expected technological capabilities of Australian students, were not evidenced in students' practices outside of school. The significance of this finding is amplified by the fact that students are anticipated to engage in these tasks both at school and outside of school, and to have the skills to transfer these skills and knowledge "across environments and applications" (ACARA, 2013c, p. 57).

Acknowledging that students will transfer technological skills and knowledge from their everyday lives to school learning suggests that students' everyday life technology practices are applicable to formal learning contexts. Findings from over 1000 young people across the UK demonstrated a range of ways of learning and skills that have the potential to enhance and supplement formal learning at school (Furlong & Davies, 2012). Extending on this work, Auld and Johnson (2014) mapped the technology practices outside of school from four student vignettes, drawn from recent studies, to the Australian literacy curriculum, These studies outline the links that can be made between students' everyday life and school practices. They demonstrate there is value in transferring these skills and knowledge between contexts to enhance students' learning *when* students engage in these practices. But the findings of this study and other empirical evidence demonstrate that not all students engage in such potentially transferrable practices (Calvani, et al., 2012; Gurung & Rutledge, 2014). This raises

questions about whether students' varied technological skills and knowledge are considered in the design of technology-integrated lessons in school.

Research often fails to recognise that the school and home contexts are different, with different sets of rules, expectations and perceptions and different cultures of technology use (Furlong & Davies, 2012). The distinction between contexts may be problematic as students attempt to apply practices associated with leisurely and social uses outside of school to formal learning applications (Beckman, et al., 2014). For example, a study of secondary students in the UK highlighted tensions in transferring skills and knowledge, demonstrating that student practices outside of school were fundamentally different to those at school (Crook, 2012). For example, students' use of the internet for inquiry tasks in the home was characterised as fragmented assembly of information, while at school students might be expected to synthesise and reconstruct the information in some form of documentation (Crook, 2012). Thus, practices from one context may not be simply embedded in another context with an expectation of achieving the same or an improved outcome.

An understanding of students' practices in their everyday lives is crucial to informing effective teaching and learning within the school context. The importance of understanding students' practices is twofold: first, and most importantly, educators must understand that students do not *all* possess the same experiences, skills and knowledge with technology. Thus the ways they engage and learn with technologies will vary. Secondly, an understanding of student practices in their everyday lives has the potential to inform links between student learning across contexts, making learning experiences relative and authentic, and helping students develop and apply skills in multiple contexts. Practical implications of these findings suggest pedagogies that cater for students' varied abilities; integration of a broader range of technologies that students are not exposed to in their everyday lives; and opportunities for students to personalise their learning to suit their varied technological and learning needs.

It is important to acknowledge the limitations of the sample of this study. The relatively small sample size limits the generalisability of the findings. Although the findings offer an important contribution to an understanding of students in one Australian context,

they do not characterise the technology practices of all students; specifically, they do not offer insights into groups of students from more disadvantaged or affluent backgrounds. More research is required about students from more varied backgrounds to understand a broader range of students' technology practices in their everyday lives. It is also acknowledged that the self-reported questionnaire and interview data collected by the study generated a subjective and partial report of students' practices. For example, it is likely that students did not report all their technology practices, but instead an account of those most commonly used; however, these partial accounts may be more likely to be of significance to students. At the same time, open-ended questions provide a voice for students to report openly and without leading or restrictive questions (Foddy, 1994). There is scope for future studies that use methods such as observation that may overcome some of the limitations of this study and may more holistically explore students' practices within their contexts.

Overall, the findings presented in this paper on students' practices in their everyday lives have some significant implications for education, but there is still more to learn. To better inform technology integration in schools, we need to establish how students' varied technology skills, knowledge and practices affect their use of technology and learning at school. Future research thus needs to investigate whether and how students make connections between their technology practices in their everyday lives and school, and how students of varying technological abilities engage with technologies at school. Additionally, rather than recommending specific pedagogies to improve technology integration, future research may also evaluate the effectiveness of strategies designed to provide equal learning opportunities for all students.

5.6 Conclusion

The scope and sophistication of students' technology practices in their everyday lives have been exaggerated. While the generational notion of tech savvy students persists in society, the findings of this study add to a growing body of literature that characterises students' practices as heterogeneous. Specifically, the findings of this study demonstrated that students' technology practices in their everyday lives were varied and personal, with students often engaging in routine and basic uses of technology. There was little evidence of students in this study engaging in technology practices in their

everyday lives that could be characterised as sophisticated or involving higher levels of thinking. This has important implications for technology use for learning in schools, specifically when not all students possess the expected or necessary technological skills, knowledge or capabilities required for learning at school. The findings of this study recommend adopting an approach to teaching and learning that considers students' varied use of technologies to inform effective teaching and learning at school.

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CHAPTER SIX

Examining the school field of technology practices

Foreword

This paper is prepared for publication as **Beckman, K.,** Bennett, S. & Lockyer, L. ‘Examining the school field of technology practices’ in *Computers & Education*. *Computers & Education* was deemed an appropriate publishing location as it invites papers dealing with educational technology and social issues and does not have an article word limit, allowing for the elaboration of the study findings and theoretical discussion. This paper contributes to the current conversation within *Computers & Education* calling for a more critical investigation of the systems and structures of schools and technology practices (Belland, 2009; Ertmer, et al., 2012).

The previous chapter characterised students’ technology practices in their everyday lives. This paper focuses on characterising the school field of technology practices. Findings from Phase 1 of the study are presented, specifically questionnaire and interview data from the four class cases, comprising 64 students and their four teachers. The findings presented in this paper are discussed through the sociological lens of Bourdieu’s theory of practice (1977). More specifically the concept of field is applied to conceptualise the school context and technology practices within this context.

6.1 Abstract

Contemporary educational technology research indicates that technology use in schools has not revolutionised education; rather, it shows evidence of more modest technology practices (Selwyn, 2011b). This paper uses sociological theory to explore technology practices in two Australian secondary schools with one-to-one laptop access. The paper presents findings from four class cases, comprising 64 students and four teachers, which investigated students' technology practices at school and in everyday life. Using Bourdieu's theory of practice (1977), the findings of this paper explore the systems and structures of the school field of technology practices and conceptualise students' use of technology within the school field. The findings characterise technology practices as being shaped by the field, and outline a number of field constructs, including habitus and capital, and their influence on technology practices. The paper concludes that a nuanced understanding of the school field may better inform technology practices for teaching and learning.

6.2 Introduction

Technology is becoming ever more ubiquitous throughout society. Part of this phenomenon involves large-scale technology investments in education in developed nations (Organisation for Economic Co-operation and Development [OECD], 2013). Technological initiatives, such as laptops for every student, are being witnessed on a global scale, with the aim of increasing use of technology in schools and enhancing student learning (New South Wales Department of Education and Communities [NSW DEC], 2012; OECD, 2010). However, it is warned that the mere presence of technology devices in schools does not guarantee a transformation of teaching and learning (Cuban, 2001). In fact, contemporary educational technology research indicates that technology use in schools has not revolutionised education, but rather shows evidence of technology integration slowly evolving teaching and learning in schools (Selwyn, 2011b). Technology practices for learning in schools should meet students' learning needs and enhance their learning (Australian Curriculum Assessment and Reporting Authority [ACARA], 2013c). Considering that student' technology skills, knowledge and practices are not uniform (OECD, 2012), it is unclear if this is reflected in how technologies are used in teaching and learning in schools. This raises questions about the purpose and effectiveness of technology use in schools.

One-to-one student access to computers is a current example of technology use in schools that has had modest and mixed outcomes. Research suggests that the use of computers in one-to-one initiatives in teaching and learning is varied, with some teachers embracing technological innovations more than others (Babell & O'Dwyer, 2010; OECD, 2013). Indeed, research evidence has demonstrated that some teachers have embraced one-to-one initiatives, adopting student-centred and process-oriented technology embedded tasks in teaching and learning activities (Babell & O'Dwyer, 2010). But equally important is the evidence suggesting that these activities are not commonplace in all schools (Lim, Zhao, Tondeur, Chai, & Chin-Chung, 2013; Zhao & Frank, 2006), and there is little conclusive evidence specifying the effects on student learning outcomes across the curriculum (Valiente, 2010). These findings depict variations in the use of one-to-one computers in schools, and indicate that we need to know more about how and why they are being used by teachers and students.

Given the modest impact of many technologies in schools, educational technology research has investigated possible reasons behind their ineffective use in school contexts. Access to technology resources dominated earlier educational technology research into technology use, although recent government initiatives in developed nations to resource schools have largely eliminated this barrier (Ertmer, et al., 2012). However, the use of technology for learning in schools is much more complex than mere access. The use of technology in school relies on the school setting up systems and structures to facilitate the use of technology, teachers integrating or creating opportunities for its use in their lessons and students engaging with these technologies as part of their learning.

Another longstanding line of investigation focuses exclusively on the role of the teacher. This body of research has largely focused on teachers' technological skills, knowledge and beliefs about pedagogy and technology. Specifically, teachers have reported barriers to use, such as deficits in technology related skills, technology supported pedagogies and knowledge of classroom management strategies for technology supported lessons (Hew & Brush, 2007). Patterns were observed in teacher attitudes and beliefs about the use of technology for learning, with research demonstrating that negative beliefs may result in minimal technology use, while positive beliefs can be a driving force for technology integration (Ertmer, et al., 2012). Though these studies highlight influencing

factors, the focus of such research overlooks the interrelations between an array of factors, which collectively determine technology practices. Broader influencing factors, such as school level integration, leadership and school planning and policy development, are also evident as significant elements in effective integration of technologies in schools (Vanderlinde & van Braak, 2013). Additionally, and potentially concerning, student perspectives and accounts are overlooked in this research of technology practices in schools.

Drawing together teacher and student perspectives within the school context offers a more holistic approach to understanding technology practices in schools. This approach to studying the field of technology use in schools may highlight similarities or differences between teachers' and students' dispositions, beliefs and perspectives on the use of technology for learning at school. More specifically, this line of research may explore whether the use of technology for learning has the same meaning or purpose for teachers and students. Such an approach raises questions such as, do students engage with technology use as teachers intended? Do teachers understand students' dispositions and learning needs with technology to effectively inform pedagogy? Exploring the classroom and school as the context in which technology is used in interactions between teachers and students may provide a more holistic understanding to inform how technologies are used in schools.

Effective use of technology for learning is of increasing importance given the continuing focus on the use of technologies for learning in schools. The prominence of educational technology at the policy level has been emphasised in many developed nations. For example, in Australia, the Australian curriculum outlines information and communication technology (ICT) as a general capability encompassing "knowledge, skills, behaviours and dispositions" that students should develop through use of technology in their everyday lives and across all subject areas at school (ACARA, 2013c, p. 57). Additionally, the use of technology in schools should enhance student learning across all learning areas (ACARA, 2013c). However, there is little conclusive evidence to demonstrate whether students possess the technological capabilities outlined in the curriculum or whether technologies enhance student learning. Thus much remains to be understood about students' technology practices for learning.

Technology use in school is a “complex, inherently social, developmental process” (Straub, 2009, p. 262). Previous research offers insights into specific elements of technology use in schools, but “a more nuanced reading of schools and schooling in the digital age is required” (Selwyn, 2011b, p. 35). Sociological theory is suggested as one approach to illuminate the nuances of technology use in schools. Theories such as activity theory, communities of learners, actor-network theory, social construction of technology and ecological perspective have been suggested for their applicability to the study of school technology practices (Oliver, 2011; Selwyn, 2012; Zhao & Frank, 2006). Bourdieu’s theory of practice (1977), perhaps a broader sociological approach (focusing on neither technology nor learning), has been proposed as another constructive lens through which to understand technology practices. The theory of practice has already been adopted in a small number of empirical studies of technology practice in education (Czerniewicz & Brown, 2013; Johnson, 2009a; North, et al., 2008; Robinson, 2009; Selwyn, Potter, & Cranmer, 2009; Sutherland-Smith, et al., 2003). These studies demonstrate the utility of this theoretical framing in highlighting a range of social and individual factors that influence the ways technology is used by students and teachers.

This paper reports on a study of secondary school students’ technology practices at school and in their everyday lives. The study frames technology practices in teaching and learning as an inherently social activity, connected to the context and individuals involved. By adopting Bourdieu’s sociological constructs, we investigated students’ and teachers’ technology practices in two Australian secondary schools, with the aim of holistically understanding students’ technology practices for learning. More specifically, to understand technology practices in these schools, the study considered the structures and systems of the school, teachers’ and students’ practices and perspectives on the use of technology for learning in school. The findings presented in this paper demonstrate the complex and social nature of students’ and teachers’ technology practices, and conceptualise technology practices in the two case study schools.

6.3 Methodology

The study investigated secondary school students' technology practices in their everyday lives and at school. More specifically, the study conceptualised their practices according to context and explored how and why students used technologies. The study used a multiple embedded case study design to provide an in-depth description of the complex relationships students have with technologies both at school and in everyday life. An instrumental case study design allowed for investigation of this contemporary phenomenon, technology practices, through rich description and with considerations of the contexts in which these practices were embedded.

The embedded multiple case design involved students and teachers at two Australian secondary schools within a regional city. The study consisted of four class cases: a Year 9 and Year 10 class from each school (Figure 3).

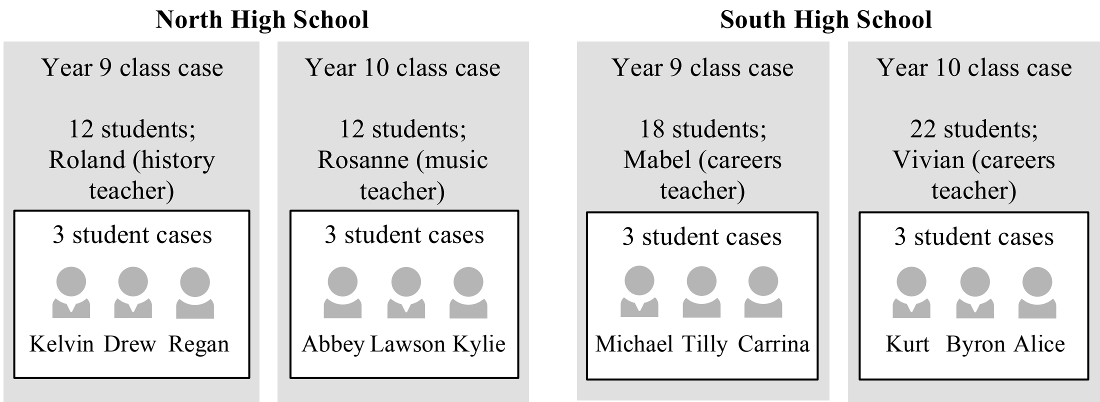

Figure 3 Embedded multiple case study design

6.3.1 Sites and participants

The two public secondary schools were in the north and south of a regional Australian city. The schools were recruited based on the accessibility of their location to the researcher and variance in size and socio-economic data (Australian Bureau of Statistics [ABS], 2013b; ACARA, 2013a). Socio-economic factors relating to technology access and family background were comparable between the two areas, in the north and south of the region, and marginally below the Australian median. Students' family background data as well as community census and statistical data indicated that the social and educational backgrounds of students' families were slightly lower than the

Australian average (ACARA, 2013a). Census data of the two school areas indicated that the median family income in the area of North High School was slightly higher than in Australia as a whole, and that in the area of South High School was slightly lower. The proportion of households connected to the internet in each area was slightly lower than the Australian median of 83% (ABS, 2013b). At the time of the research South High School had 1207 students enrolled and 77 teaching staff, while North High School was smaller, with 657 students enrolled and 54 teaching staff (ACARA, 2013d).

Sixty-four students participated in the study across the four class cases. The four classes were recruited based on convenience sampling (teacher volunteering), the year level taught and the teachers' interest in technology, either as a frequent or keen technology user or as being interested in developing their use of technology for teaching and learning. The teacher of each participating class also contributed to the study. The four teachers were from various faculties with varying years of teaching experience. The teachers from North High School were both interested in the use of technology for learning: Rosanna was a confident technology user, while Roland was seeking to improve his practices with technology in the classroom. The teachers from South High School also expressed interest in technologies: Mabel also sought to improve her practice, and Vivian was the ICT coordinator of the school.

The student participants were young people enrolled in Years 9 and 10 of secondary school. These grades were selected to be part of the study due to their inclusion in the Australian Commonwealth government's *Digital Education Revolution* one-to-one laptop program (NSW DEC, 2012). This initiative (now completed) saw each student from Years 9 to 12 in public secondary schools issued with a laptop, customised with software and capabilities for educational practices. This provided the opportunity to study students with access to computers in all classes. More recently, with the development of the Australian National curriculum, technology has received increased prominence. In the Australian curriculum, implemented in Australian schools from 2014, technology is outlined as a general capability students must develop across all subject areas, as well as the introduction of technology specific subjects to be implemented from 2016 (ACARA, 2013b).

6.3.2 Methods

The data collection occurred in two phases (Figure 2). The first phase of the study involved the class cases, which collected student questionnaire and teacher interview data. The second phase focused on yielding more detailed accounts of students' technology practices through 12 student cases. This paper reports on Phase 1 of the study, which includes both teacher and student perspectives.

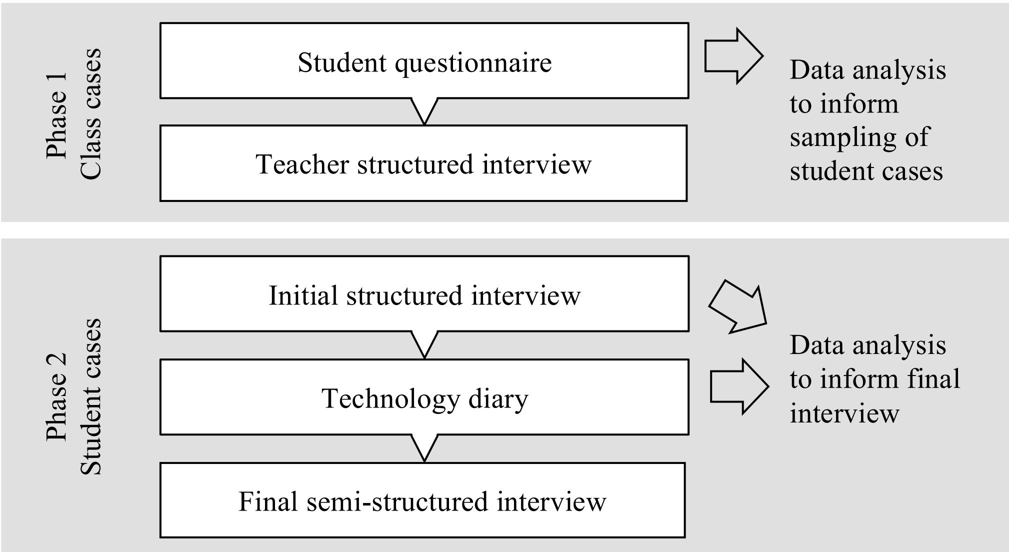

Figure 2 Data collection phases and methods and initial data analysis

The data from the first phase of the study involved students and teachers from the four class cases and yielded a broad data set of teachers and students' access and uses of technologies at school and in their everyday lives. The student questionnaire consisted of closed and open-ended questions exploring students' backgrounds and technology practices at home and school. The findings presented in this paper feature data relating to students' technology practices at school and perspectives of technology for learning. This paper also presents data about students' practices at home to allow for comparison of practices across contexts. Teachers were interviewed about their use of technologies for teaching and learning, their perspectives on students' practices with technology and the place of technology in education. The data from these interviews allowed for triangulation and comparison between students and teachers' descriptions of integrating technology in the classroom.

The data was first analysed by coding the data using categorical aggregation to establish themes and patterns. More specifically, the interviews and open-ended questionnaire items were coded according to the purposes of technology practices, individuals involved and themes and patterns in perceptions. These themes and patterns were also analysed across class cases to highlight uniformity or disparity between students' technology practices (Stake, 2006). A second line of data analysis was guided by the theoretical orientation of this study, Bourdieu's theory of practice (Bourdieu, 1977). The theoretical constructs formed a second coding framework that was applied to the data and analysed along with the thematic analysis. The findings are presented according to students' and teachers' uses and perspectives, while the theoretical analysis is presented in the discussion.

6.3.3 Theoretical framing

The study was guided by the theoretical work of sociologist Bourdieu (1977). His theoretical constructs of field, habitus and capital provide a lens through which to view and understand individuals and their practices with consideration of the social and cultural milieu in which the practices are embedded.

This paper centres on Bourdieu's concept of field to theorise the contexts in which students use technologies. Bourdieu does not define fields in a physical sense, but rather as social networks of individuals and groups and the relations, structures and systems that define them (Bourdieu, 1990b). Habitus is an individual's history internalised. Habitus comprises an individual's ways of acting, beliefs and dispositions shaped by their past and present circumstances and experiences (Bourdieu & Wacquant, 1992). Capital refers to the symbolic and physical assets possessed by individuals (Grenfell, 2009). Capital is derived through developing and maintaining social relationships, networks, skills and knowledge. These concepts will be elaborated in their application to the study in the discussion.

The theory of practice allows for consideration of social and contextual factors. Thus, it informed the design of this study's data collection tools, including the questions in the interviews and questionnaire. More specifically, the data collection was designed to consider not only technology use, but also the milieu of use including the purpose,

location, resources and others involved and the individual's perspective of technology use. Therefore, the term "technology practice" is used in this paper to encompass the technology use itself along with the perspectives from which it is used.

6.4 Findings

The findings presented in this paper report on the data from Phase 1 of the study, which consists of selected data from the student questionnaire regarding students' technology practices at school and at home and their perspectives on technology for learning; and data from teacher interviews, including their technology practices for teaching and learning and their perspectives on the use technology in schools.

6.4.1 Students' technology practices

All students involved in the study used technologies both at school and in their everyday lives. Data from open-ended items in the student questionnaires asking what technologies students use most according to context demonstrated five broad categories of technology use at school and in everyday life (Figure 5): inquiry, creation, communication, entertainment and management. The five categories refer to the purpose of the technology use, and were developed through analysis of the data. Inquiry relates to information seeking practices; creation involves making a product such as documents, presentations or videos; communication refers to using technology to communicate with others; entertainment refers to the range of technologies an individual uses for enjoyment, including watching videos, listening to music and playing games; and management relates to technologies to organise individuals' work and/or activities.

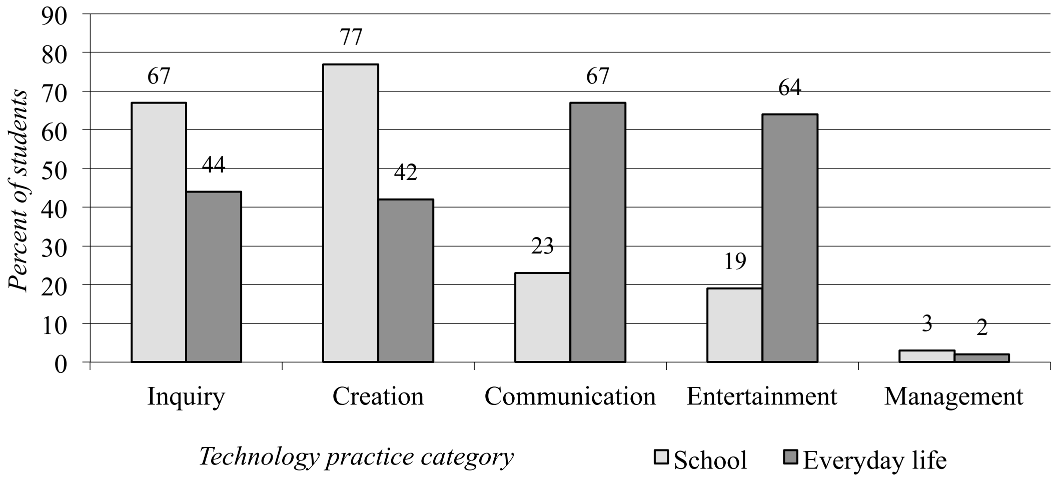

Figure 5 Technology practice categories students used at school and in everyday life

The prevalence and nature of inquiry practices were comparable across both schools. Inquiry practices at school were more prevalent than those in students' everyday lives. At school, inquiry practices included performing internet research to answer questions in class and complete assignments and searching for images online, predominantly under teacher direction. Students reported that they used inquiry tasks in their everyday lives generally for two broad purposes: to complete work or assignments set by the teacher (34%), or for interest driven internet browsing (21%).

Creation uses were the most commonly reported task completed at school. Findings indicated that students across the two grades participated equally in these types of uses, although more students from South High School reported undertaking creation uses (88%) than students from North High School (58%). The most common types of creation uses were using laptops to take notes (50%) and completing unspecified "schoolwork" (42%), while uses like creating presentations and photo editing were less common (8%). Many students, especially those from South High School, described using their laptops in this manner as a routine part of the school day; as one student described, "I use my school laptop mostly for typing up what is written on the board, typing notes on OneNote, [and] assignments on Word or PowerPoint" (Year 10 student, South High School, Questionnaire). Creation uses completed at home predominantly aligned with those at school, involving completing work from school or set by the

teacher (38%). Students also took and edited photos (10%) and one student planned stories on the computer (2%).

In the communication category, socialising was the most common use of technology in students' everyday lives. Half of students reported using social networking sites, most commonly Facebook, Twitter and Instagram. Students also made phone calls, sent text messages (39%) and emails (6%) and used Skype (2%). Communicating using technology was not as frequently reported at school. Students from North High School did not report using their mobile phones or iPod Touch devices to communicate with peers at school. However, 31% of students from South High School reported using their mobile devices to communicate with peers and family. As one student described, “I use my mobile phone to text people during class and during break times” (Year 10 student, South High School, Questionnaire). Students did not describe using technology to communicate about school related practices.

Entertainment related tasks were similar across contexts, but perhaps not surprisingly, more prevalent in everyday life (64%) than at school (19%). Students’ uses of technology for entertainment at school were reportedly playing games (13%), sharing and downloading video files with peers (4%), watching videos (2%) and listening to music (6%) in their free time or when they had completed work in class. Outside of school students engaged the same practices, albeit to a greater extent, and also downloaded music (3%) and read e-books (2%).

Management practices were the least common across all categories. A small number of students also used their mobile phones at school and home for management related tasks including to manage their school timetable (2%) and to set alarms or reminders (4%) and clock and timer applications (2%).

Overall, the questionnaire responses show that the frequency and purposes of students’ technology practices at school and in their everyday lives were different, with the exception of schoolwork. Many students performed inquiry and creation practices both at school and in their everyday lives to complete work, homework or assignments set by the teacher. Notably, students’ uses of technology for creation, both at school and in

their everyday lives, were fairly mundane, with students predominantly creating Word documents to types notes and for writing.

Across the four class cases, there were some differences in students' technology practices according to grade. Overall, students in Year 9 reported using fewer technologies both at school and at home. There was also variance between the two schools, with more students at South High School using mobile phones and other mobile devices at school for communication tasks. While both schools had similar policies prohibiting mobile phone use, it suggests that there may be differences in how these are enforced by teachers at each school.

6.4.2 Students' perspectives on technology practices for learning

When asked about their perspectives on technology practices for learning, most students expressed generally positive attitudes (66%). Students described technology practices as providing a wealth of easily accessible information online (50%); as one student described, "I think it's very important, because it's much easier and if you're unsure about something you can use the internet or simply email your teacher when out of school" (Year 9 student, South High School, Questionnaire). Students also described technology affording ease and efficiency in the completion of tasks (19%).

Nine students stated they believed that using technology for education related purposes improved their learning. For example, one student commented, "We can research multiple things and broaden our knowledge and it is an advantage" (Year 10 student, North High School, Questionnaire); another said, "Technology allows us to access a higher level of education. We are able to view current information and present work at a high standard" (Year 10 student, South High School, Questionnaire). A smaller number of students expressed both positive and negatives views about technology for learning (14%), and another 16% of students expressed concerns about its use. Specifically, some students believed that they could learn more effectively without technology, for example using books or writing with pen and paper (13%), and felt that technologies distracted them from learning (9%). One student explained, "I don't think typing on a laptop helps me learn. I'd rather write information on paper, rather than typing,

[because] it sinks in better…. I do think that technology may be a distraction for your learning" (Year 10 student, South High School, Questionnaire).

6.4.3 Teachers' technology practices for teaching and learning

During the interview, teachers described adopting a range of technologies in their practices at school. They described their use of technology at school for teaching and learning in the classroom in general, not only in the class cases included in this study. Teachers' technology practices for teaching and learning included practices from all technology practice categories, with the addition of using technology to present lessons to students in class. Teachers reported facilitating student use of the following technology practices as part of their teaching (the number of teachers reporting each practice is indicated in parentheses):

- *Presentation*: Digital projector or an interactive whiteboard (IWB) to present lesson content to students (4)
- *Inquiry*: Conducting internet research by either modelling to the class or directing students to conduct independent inquiry (3)
- *Creation*: Word processing and presentation software, including Microsoft Office and Adobe (3), still and video cameras (3), creating and editing audio files (1)
- *Communication*: Learning management systems (4), email to communicate to staff and students (4), video conferencing (1)
- *Entertainment related*: Watching videos (4), interactive educational games (3), listening to music (1), giving access to games console as a reward (1)
- *Management*: Sharing/transferring files (1)

To gauge which technologies were used most often, participants were asked which technologies they used on a weekly basis in their teaching. All participants reported students conducting internet research as the most frequently used technology. Other regular technology uses included using an IWB or digital projector to present lessons (2), watch educational videos (3), listen to music (1), use Edmodo to provide students with reminders during roll call (1) and instruct students to create Word documents and PowerPoint presentations (1). For many of these teachers, the use of technology was a routine practice, but often either a minor or additional aspect of their lesson; as Roland described, "My lessons are changing now from the old overhead projector to not only

PowerPoint but access to, say, YouTube clips [through] the ClickView system. So throughout different classes I can integrate a short film clip" (Roland, History, North High School). Another teacher, Mabel, described the technologies she used at least weekly in her lessons with students: "PowerPoint and Word…. I can't think of anything else apart from going on and maybe research; research would be the other big thing – 'Go and find something about…'" (Mabel, Careers, South High School). These findings demonstrate that while these teachers integrated a wide range of technologies into their teaching, their regular technology practices were more modest in scope.

The introduction of school-issued laptops in 2009 had an impact on teachers and their classroom practices. Teachers in the study described how student laptops prompted them to alter their pedagogy and behaviour management strategies in the classroom. For example, Roland described replacing older technologies such as an overhead projector with PowerPoint presentations or videos, and Mabel and Vivian described using Moodle and Edmodo to deliver worksheets and questions to students instead of paper. Vivian and Roland described how they perceived teachers as being underprepared and often insufficiently trained to integrate new technologies. Vivian described the sentiment of teachers at South High School:

> They're good-quality teachers…. [A]s soon as you added these laptops and devices into the rooms, they had to change their teaching strategies, their discipline strategies and the way they delivered lessons. They've been doing it for years; that's what they're confident with and they've got results and you've automatically…taken them out of their comfort zone. (Vivian, Careers, South High School)

Roland also described teachers as "still struggling to try and catch up" with the introduction of new technologies (Roland, History, North High School). He described the introduction of the school-issued laptops as rapid, allowing minimal time for teachers to learn about how they, themselves, would use the laptops and how to use them with students in the classroom.

Despite these pedagogical challenges, teachers were most concerned with safety and managing student behaviour when using laptops in the classroom. Mabel described concerns about student safety online: "[I]t's a big responsibility when there are 30 kids sitting there with a phone or even a computer" (Mabel, Careers, South High School).

Teachers also described a general lack of control over the content students could access online in class. For example, one teacher verbalised his thinking during students’ use of their laptops in class: “What are they doing? I hope they’re doing what they’re supposed to be doing” (Roland, History, North High School).

During interviews, teachers discussed their schools' policies on students’ use of electronic devices, including mobile phones. These policies stated that students were not to use their electronic devices unless specifically given permission to do so by a teacher. Teachers described that the policies had not been updated to accommodate the introduction of laptops, nor were new policies introduced to provide specific guidelines for students’ and teachers’ use of the school-issued laptops. Teachers also discussed the rules within their schools for students’ use of their laptops. North High School had a rule that students’ laptops were to be left in their school bags unless the students were instructed by a teacher to use them. South High School was in the process of developing a policy for the use of laptops at school, prompted by Vivian. She described her frustration: “[S]chools have got these laptops for years before they decided to have a technology policy” (Vivian, Careers, South High School). Vivian explained that not enough teachers at the school were requesting students to use laptops, and consequently students often left their school laptop at home. She indicated that a policy that outlined rules and expectations for practice would support students and teachers in their integration of laptops in the classroom.

6.4.4 Teachers' perspective on technology practices for learning

Teachers in the study reported that students in their classes had varying levels of technology skills and knowledge. While teachers described some students’ sophisticated knowledge for downloading and sharing video and game files and engaging in social networking, their experience was that students’ educational uses of technology were limited by their skills. More specifically, teachers expressed concerns that students lacked basic competency with formatting Word documents, PowerPoint presentations and other document types, as well as sending emails and conducting research. Roland explained, “Surprisingly, they’re teaching each other how to use PowerPoint too. I thought they all knew how to do that now, but some of them don’t” (Roland, History, North High School). Another teacher also described students’ lack of troubleshooting

skills: “They don’t seem to have any troubleshooting skills…so if they’re getting a bit stuck they just say, ‘It’s just not working’” (Rosanne, Music, North High School). Three of the four teachers interviewed in this study stated that they did not explicitly teach technology skills in their lessons. For example, Vivian said: “What we do in high school, which is bad again, is we say to kids, ‘I want you to go out and do an assignment on dogs; do a PowerPoint’, but we don’t teach kids how to do a PowerPoint properly” (Vivian, Careers, South High School).

While the teachers in the study had some concerns about integrating technologies in the classroom, their perspectives on the place of technology in education were generally positive. All four teachers expressed a belief that technologies were a part of students’ lives, and that schools had a responsibility “to prepare them for life” (Rosanna, Music, North High School). Teachers described that they felt it was their role to prepare students for a technological working future after high school. However, Vivian said that this was not necessarily demonstrated in teachers and students’ technology practices at school: “[T]echnology is where the future is going and we need to prepare kids for that through education. And that’s requiring the use of technology, and we’re not doing it” (Vivian, Careers, South High School).

6.5 Discussion

The findings presented in this paper demonstrated that students and teachers performed a range of technology practices, but regularly used a modest set of technologies. Students and teachers most frequently engaged in online inquiry and using word processing applications for writing. Evidence from students’ practices with technology at school and in their everyday lives and from teachers’ perspectives further depicted modest technology practices and overall basic levels of skills in and knowledge of technology use for learning.

This discussion presents an in-depth exploration of technology practices at school through students’ and teachers’ perspectives. The discussion considers the relationships between individuals (students and teachers) and aspects of the school (systems and structures), and the implications of these findings for effective technology practices in

schools. To do this, the school field of technology practices is explored using Bourdieu's theoretical constructs field, habitus and capital (Bourdieu, 1977).

6.5.1 Individuals in the school field

Students

The findings presented in this paper demonstrated that the ways students used technologies at home and school differed. While students engaged in technology practices for inquiry, creation, communication, entertainment and management purposes at school and in their everyday lives, their uses in each field were distinct. However, students' practices are more complex than a simple dichotomy of home leisurely practices and school education practices. Simplifying the differences in technology practices may hamper efforts to better understand and inform technology practices for learning. Undoubtedly, students' school and everyday life contexts are different, and it is these contextual factors that shape students' technology practices (Furlong & Davies, 2012).

The distinction between academic and everyday life purposes of technology use suggests that students perceived these uses of technology as different. This distinction has implications for the potential relevance and transference of their everyday life technology practices at home to practices within the school field. Specifically, the findings demonstrated that school related uses of technology for inquiry and creation uses were largely teacher directed in both school and home contexts. The findings also suggest that students did not demonstrate transference of knowledge, skills and behaviours across their everyday life and school uses of technology. Therefore the findings of this study emphasise the significance of the field structures and systems and how these shape students' technology practice according to context. The field structures and systems (for example, rules, policy and curriculum) also shape the potential transference of knowledge, skills and practices across contexts, though the influence of such factors is not always considered at empirical or policy levels (ACARA, 2013c; Auld & Johnson, 2014; Lai, et al., 2013).

Additional to the field structures and systems, students' technology practices were shaped by their habitus. Habitus encompasses an individual's ways of acting, beliefs

and dispositions, which are shaped by their past and present experiences and circumstances (Bourdieu, 1990b). In this study, students' habitus was suggested in their descriptions of technology practices, and their perspectives on and preference for technology use for learning. Two-thirds of students in this study held positive perspectives on technology use at school that aligned with their practices at school. For example, students regularly conducted internet research, and consequently described that technology as providing opportunities for them to access a wealth of information. This indicates that their habitus or beliefs about technology for learning were shaped by their experiences with technology for learning. However, the findings also indicated that students had varied preferences for using technologies for learning, with some students stating that they felt technology was a distraction to learning. This suggests that some students' dispositions toward technology use for learning did not align with that of the school field. This is significant, as it suggests that technology use at school may not facilitate learning for all students in this study. This finding is consistent with another recent Australian study of teachers' and students' technology practices in five Australian secondary schools, which found that students had varied preferences to use or not use technology for learning (Shaw, et al., 2013). This is particularly significant given the current expectations of students' technology practices in the national curriculum:

> To participate in a knowledge-based economy and to be empowered within a technologically sophisticated society now and into the future, *students need the knowledge, skills and confidence to make ICT work for them at school*, at home, at work and in their communities. (ACARA, 2013c, emphasis added)

This suggests that all students should or need to use technologies effectively at school. However, evidence suggests that the ways technology works for students are not uniform. Also of concern is that for a small number of students in this study, technology was not facilitating their learning at school, but rather a distraction to their learning.

Students' technology practices were also determined by their capital. Capital refers to the skills, knowledge and tastes developed through an individual's relationships and networks of contacts (Grenfell, 2009). In this study, students' capital was gauged through teachers' perceptions of students' technological skills and knowledge. Teachers expressed beliefs that students lacked the capital to complete certain tasks at school.

This is perhaps not surprising, considering that teachers stated that they did not teach these skills, and students themselves revealed that they did not perform such practices in their everyday lives. This finding is consistent with emergent evidence that demonstrates students' technological skills and knowledge is varied, with many students lacking skills and knowledge relating to academic technology practices (Calvani, et al., 2012; Crook & Sharma, 2013; Samuelsson, 2012). Though students may have technological capital in their everyday life uses of technology, these skills and knowledge may not be of value in the school field. For example, the skills involved in online gaming may have little application or relevance in the school field. Capital is only of worth when recognised by the field (Grenfell, 2009). This has implications for how students develop and transfer technological skills and knowledge in their everyday lives and at school, particularly in cases where students may not have access to relationships and networks of contacts to support them in their everyday lives.

Teachers

The findings presented in this paper demonstrated that teachers' regular uses of technology for teaching and learning were narrow in scope, and focused mainly on presenting digital content to students and facilitating students' use of word processing applications and internet research. Teachers' uses of technology for teaching and learning were also shaped by their habitus and capital.

In this study teachers' habitus was suggested through their beliefs about and perceptions of technology use for teaching and learning, their beliefs about their students' learning needs and their practices with technology at school. The findings indicated that the ways teachers used technology for teaching and learning were in line with their broader teaching practices. For example, teachers described using technology to replace other technologies such as an overhead projector to present content or paper worksheets to structure activities, or students using their laptops rather than their paper notebooks for note taking or other writing activities. This suggests teachers' technology practices were shaped by their habitus or accepted ways of acting in the school field. This finding provides a fresh perspective on the reasons behind the slow evolution, rather than transformation, of technology use in schools.

Teachers reported that they believed schools had an important role in preparing students to be technologically competent and to prepare them for future success in a digital society. While this sentiment aligned with that of national curriculum objectives (see ACARA, 2013c), the perception was not evident in teachers' regular teaching practices. Teachers' use of technology was determined by their capital. Teachers' capital was manifest in their descriptions of their own challenges relating to technology use in school. The teachers in this study described a general lack of capital specifically related to using technologies in their teaching. Teachers reported that they had little support with no opportunities for professional learning in this area. These findings suggest a misalignment between teachers' habitus and their ability to implement such practices (their capital). Empirical research has demonstrated the importance of the alignment of such factors (Ertmer, 2010; Howard & Thompson, 2015). One study of teachers demonstrated the need for their beliefs, knowledge and self-efficacy to be aligned to facilitate technology practices in teaching and learning (Ertmer, 2010). The findings of this study provide further evidence, through a fresh perspective, of the relational nature between teachers' practices, beliefs (habitus) and knowledge (capital) in shaping technology practices in teaching and learning. Furthermore, the theory of practice outlines that the field, including the individuals who make up the field and its systems and structures, also shapes practice. Therefore the following section examines the school field of technology practices, drawing together the interrelations between students, teachers and the school field.

6.5.2 The school field

Bourdieu's concept of field is a useful construct to examine the school context of technology practices. It is important to note that Bourdieu does not define fields in a physical sense, but rather as social networks of individuals and groups and the relations, structures and systems that define them (Bourdieu, 1977). From the findings presented in this paper, the fields students occupied most were their homes and school. While these are physically bounded spaces, they are also defined by the individuals who occupy them (including students, teachers, executive and administrative staff); including the social relations, systems and structures (including resources, policies, curriculum, rules) (Bourdieu, 1990b). It is acknowledged that the scope of this study did

not encompass all aspects of the school field, but instead focussed more deeply on the perspectives of students and teachers in the school field.

A field is defined by the individuals who occupy it and their practices. Therefore, in this study the school field of technology practice was shaped by teachers' and students' practices. Furthermore, the students' and teachers' technology practices shaped each other. More specifically, the technology integrated learning experiences designed by teachers were determined by the teachers' habitus (beliefs about technology and learning), and capital (skills and knowledge with technology and teaching). Thus, teachers' perceptions and practices with technology in the classroom influenced students' practices with technologies at school, in turn shaping students' habitus and capital.

The structure of the school field also determined teachers' and students' technology practices in the field. The findings presented in this paper demonstrated that the physical resources available in the school field determined the opportunities for students' and teachers' technology use. Specifically, the use of technology in these schools was predominantly limited to the use of laptops and interactive whiteboards or digital projectors. Perhaps more significant were the non-physical structures of the school field, including the school rules and policies.

The teachers discussed how school rules and policies guided the use of technology for both students and teachers. Specifically, teachers described the deficiency of school technology policies to adequately provide guidance and expectations for teachers' and students' use of technologies, and school rules that restricted students' use of laptops in the classroom. The use of school-issued laptops had been present in the schools and integrated in the classroom for two years prior to the research being conducted. However, the school habitus, evident in the schools' technology policies and rules and expectations for technology practices, did not align with teachers' habitus.

The systems and structures of the school field extended into students' home fields of technology practices for learning. Students' practices at school and in everyday life were generally distinct, with the exception of academic uses. However, through Bourdieu's concept of field, it may be inferred that students' technology practices for

academic purposes in their homes were subject to the systems and structures of the school field. Thus, these practices were linked to the school field rather than the home, and therefore subject to different rules and expectations. This is consistent with other findings that indicate students' uses of technology for school related purposes at home largely reflect those performed at school (Harris, et al., 2013; Kent & Facer, 2004; Persson, 2014; Wang, et al., 2014). The guiding sociological theory of this study provides a new perspective in understanding the reasons behind these similarities, suggesting that academic practices at home are shaped by the rules of the school field.

The structures and systems of the school field are important considerations, not only to understand technology practices, but also to understand variations in students' technology practices and potential affects on student learning. Students' practices and, ultimately, success with technologies in the school field are determined by the alignment of their habitus and capital with those of the field (Swartz, 1997). Bourdieu used an analogy of a game to explain field, whereby individuals hold positions and must learn and follow the rules of the game to play (Bourdieu, 1990b). In applying this analogy to the school field, students assume less power and a lower position than teachers. Teachers and students alike must follow the policies and rules of the school, which include the school's culture of technology use. An individual's ability to understand and abide by the rules of the field is shaped by the alignment of their habitus and capital with that of the field. The findings of this study revealed students' varied dispositions about and capabilities with the use of technology at school. Therefore, it may be inferred that students' ability to play the game, which is the successful use of technology at school, may not be equal. This has implications for students' engagement and success at school when using technologies. For example, students who expressed a preference not to use technology for learning at school held opposing beliefs to teachers and the school about the place of technology in education. In contrast, other students expressed positive attitudes towards how technology was used in school: to access information online and complete tasks with ease and efficiency. This suggests that the latter students' habitus aligned with that of the technology practices in the school field. This has important implications as the (mis)alignment of students' habitus and capital may reproduce social variances or inequalities. Thus the alignment between individuals and fields may provide insights into students' and teachers' practices with technology.

This may be of particular relevance in cases when the use of technology is not working for students or teachers.

6.5.3 Implications for teaching and learning with technology in schools

Understanding the interrelation between individuals and the systems and structures of the school field redirects empirical discourse beyond the perspective that schools and teachers are at fault for modest technology integration. This "rather unhelpful 'blame game'" (Selwyn, 2011b, p. 34) has little to offer in informing future directions for technology practices in schools. For instance, research exploring barriers to technology integration have been well documented in the literature (Belland, 2009), outlining influences of teachers' knowledge, self-efficacy and beliefs about technology and learning (Ertmer & Ottenbreit-Leftwich, 2010). While studies such as these offer useful insights, the adoption of a sociological research approach allows researchers to highlight the multifaceted nature of technology practices.

The guiding sociological framework of the study presented in this paper highlighted a range of interrelated and influencing factors on students' and teachers' technology practices at school. The findings demonstrated how the alignment of the habitus and capital of teachers, students and the school might facilitate technology practices in school. Specifically, we have demonstrated a range of relational influencing factors, including the school's culture of technology use, rules and policies (field and habitus), the perspectives of students and teachers (habitus) and the knowledge and skills possessed by students and teachers to engage in technology practices (capital). An understanding of the interrelated nature of these factors provides a holistic interpretation of technology practices in schools. This has important implications for the introduction of new technologies in schools. The findings suggest that to facilitate the use of technology, students' and teachers' current practices, beliefs and dispositions, as well as the rules and policies of the school field, must be considered.

It is important to acknowledge the limitations of the findings of the study. The multiple embedded case study presented in this paper was set in a regional city in Australia, which was not representative of all populations. There are also limitations in self-reported data through open-ended questionnaire items and self-reporting in interviews.

It is likely that students' accounts of their technology practices may provide only aspects of their practices and teachers' perspectives of students' are subjective accounts. Therefore, connections should be made with consideration of the contextual information presented and at the readers' discretion. Another important consideration in the analysis of the research findings is the limitations associated with the application of Bourdieu's sociological concepts. It is acknowledged the scope of this study did not encompass all individuals of the school field, and therefore the findings reflect only part of the school field. Therefore, there is undoubtedly further scope for the sociological inquiry of the school field of technology practices and scope for educational technology research framed by other sociological theory (Bennett & Oliver, 2011; Selwyn, 2012). While the sociological theory used in this study provided a more holistic interpretation of technology practices in schools, the findings also raised questions about other influencing factors. More specifically, the findings suggest that a closer examination of school rules, policies and school leaders may provide further insights into understanding the school field of technology practices. Furthermore, the findings raised questions about the broader influencing factors outside of the school field, including the more detailed accounts of the influence of students' technology practices at home and in other everyday life contexts.

6.6 Conclusion

Evidence indicates that students' technology practices at school and in everyday life are not uniform, but instead are structured and shaped by the social context in which the practices are embedded. These findings indicate that technology practices are social and complex; thus, to understand students' technology practices we must also acknowledge the social landscape (Bourdieu, 1990b). This paper explored the school field of technology practice from students' and teachers' perspectives demonstrating relational and structuring influence of the school's and teachers' practices and perceptions on students' technology practices. Viewing the school field of technology practices provides an understanding of the multifarious and relational factors that ultimately determine students' technology practices within the school. While each new technological innovation presents new challenges and opportunities, a more nuanced understanding of the social nature of technology practices in schools may better inform the integration of new technologies.

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CHAPTER SEVEN

Understanding students' use and value of technology for learning

Foreword

This paper, published as **Beckman, K**., Bennett, S. & Lockyer, L. 'Understanding students' use and value of technology for learning' in *Learning Media and Technology*, presents student data from the second phase of the study. *Learning, Media and Technology* approve the paper's inclusion in the thesis for the purpose of examination (Appendix B). Minor alterations have been made to the formatting, figure numbers and referencing style of the paper for the purpose of cohesion within the thesis.

The previous two chapters concentrated upon the first research question, characterising students' technology practices in their everyday lives and at school. This paper moves toward uncovering a deeper understanding of these technology practices, through presenting data from the 12 student cases. Specifically, it focuses on the second and third research questions:

- How do contextual factors influence students' technology practices? and
- Why do students use technologies?

Thus, this paper explores both the everyday life and school contexts of students' technology practices, and uses Bourdieu's theory of practice to illuminate the underlying logic of students' technology practice.

7.1 Abstract

Despite significant research in the field of educational technology, there is still much we do not fully understand about students' experiences with technology. This article proposes that research in the field of educational technology would benefit from a sociological framing that pays attention to the understandings and lives of learners. Within a broader study that aimed to investigate students' use and value of technologies guided by Bourdieu's sociological theory, this article reports on qualitative embedded case study data of 12 students in years 9 and 10 from two Australian secondary schools. The article provides detailed accounts of students' experiences with technologies in various contexts with consideration of the milieu in which technology use occurred, illustrating the heterogeneous and complex network of influencing factors on students' technology practices. The findings and discussion augments the application of Bourdieu's concepts of field, habitus and capital as a tool to view and understand students' varied and complex experiences and relationships with technology.

7.2 Introduction

Significant government investment to resource schools with digital technologies has occurred on a global scale. Infrastructure developments, like resourcing schools with computers and internet access, has been a focus worldwide (Balanskat & Garoia, 2010; iN2015 Education and Learning Sub-Committee, 2006; New Zealand Ministry of Education, 2013; Organisation for Economic Co-operation and Development [OECD], 2010). In Australia, the federal governments' commitment to digital learning was demonstrated by the implementation of the *Digital Education Revolution*, a $2.1 billion five-year (2008-2013) initiative to provide infrastructure to schools through access to high-speed internet, digital learning resources and teacher professional development (AICTEC, 2013). This initiative included the *Laptops for Learning program* (DEEWR, 2008) to achieve a one-to-one ratio of computers to students in the upper years of secondary school.

Despite investment in technology in schools, empirical research demonstrates that the current state of education systems is far from the revolution promised by such initiatives (OECD, 2010; Shaw, et al., 2013). For example, 2009 PISA data of 15-year-old students from 65 countries indicated no correlation between frequency of computer use

at school and student test performance (OECD, 2011). This suggests that, despite investment over past decades, there is little evidence that technology has had an impact on student learning experiences and outcomes (OECD, 2011; 2013). Research into students' perspectives can provide insights into the complexities of students' experiences to improve the ways technology is integrated in school (Selwyn, et al., 2009). To date research has provided little in-depth understanding of students' experiences with technology for learning from the perspective of students. And, perhaps due to the atheoretical nature of the research, findings often raise more questions about students' technology use than answers (Bennett & Maton, 2010; Crook, Sharma, Wilson, & Muller, 2013).

A small number of quantitative studies exploring students' perspectives have begun to provide an empirical basis for understanding students' perspectives (Crook, et al., 2013; Ellis, et al., 2011). Studies that have adopted mixed methods including interviews, observations and questionnaires to garner students' perspectives have demonstrated the valuable insights gained through more in-depth inquiries (Brown, 2012; Concole, et al., 2008). For example, a large-scale study of over 600 UK primary aged students used interviews, surveys and student illustrations to explore students' perspectives (Selwyn, et al., 2009). The exploratory nature and corroboration of data revealed new insights and exposed contradictions to widely held views about students' use of technologies.

Bourdieu's sociological theory has been taken up by some researchers to investigate the social nature of technology for learning, acknowledging the social and cultural milieu in which technology practices occur. This relatively small body of research has used the theoretical constructs to consider the influence of students' socioeconomic and sociocultural backgrounds and familial practices on students' practices with technologies. For example, Bourdieu's concepts were key to research on teenage technological experts to conceptualise their formal and informal learning experiences with technology and the implications for the school field (Johnson, 2009a, 2009b). While other studies have focussed on particular elements of Bourdieu's theories. The concept of habitus was used to study the relationship between young people's digital tastes and social class (North, et al., 2008). The case studies of 25 Australian 15-year-olds suggested a strong link between technology use and class. It was reported that the

capital of their family informed the dispositions of the young people, thus impacting on their engagement with and interest in technology. A small number of studies have too used Bourdieu's concept of capital, demonstrating associations between familial capital and how the social class of parents informs the perceived potential of technologies for learning (Hollingworth, et al., 2011; Sutherland-Smith, et al., 2003), and primary students' use of technologies for homework (Cranmer, 2006). Through the use of Bourdieu's sociological constructs these studies were able to illustrate narratives of practice, providing an understanding of the circumstances and experiences that presuppose practice. These studies demonstrate the worth of sociological framing and in-depth investigation of students' learning lives. Yet, despite their contribution to understanding students' relationships with technologies, studies such as these with a sociological approach are not common.

The study reported in this paper investigated the relationships secondary school students have with technologies both at school and in their everyday lives. The study was guided by Bourdieu's (1986b) concepts of field, habitus and capital. Specifically, it explored the way students experience technologies at school, in their homes, at work, and in other social contexts. Ultimately, the study aimed to investigate the nexus between these contexts with the aim of informing an approach to teaching and learning that considers students' varied experiences, knowledge, perspectives and backgrounds. This study advances knowledge by investigating young peoples' technology use through their perspectives, and taking into account the milieu in which technology use occurs guided by the sociological theory.

7.3 Methodology

This paper draws on the student case data of a broader multiple embedded case study of students in two Australian secondary schools. The aim of the study was to investigate the broader milieu of students' technology practices, through listening to the students' perspective, to demonstrate the complex network of contextual and circumstantial influences on students' technology practices.

The two schools participating in the case studies were both regional schools with socio-educational values slightly lower than the Australian average (ACARA, 2012). Census

data of the two communities indicates that the area of the North high school had a median family income higher than Australian median, while the area of the South high school was below the national median (ABS, 2011). Households connected to the internet in both areas were lower than the Australian average (80%), with the northern region (77%) slightly more connected than the south (65%) (ABS, 2011). Thus, the two schools represent polarity of the Australian household averages of income and internet access.

The study involved two class cases from each school, with a total of 64 students. From within each of these class cases three students were selected as cases (Figure 6). Student cases were selected through purposeful maximal sampling (Creswell, 2007), based on data from the questionnaire, administered with the class cases, with the aim to include variation in students' family backgrounds, and access, use and perceptions of technology.

Figure 6 Study design depicting class (4) and student (12) cases within the two secondary schools

The 12 student cases provided in-depth descriptions and insight into students' technology practices through a series of rigorous and exploratory data collection activities that spanned over a 10-week period. Firstly, students participated in an initial one-on-one semi-structured interview with the aim to discuss students' practices with technology at school but more importantly to begin to uncover more detail about their background, dispositions and the value placed on specific technologies and why.

Students then recorded all technologies used over a two-week period in a technology diary. These diary records provided a snapshot of technologies used over a period of time, but also served as a stimulus for discussion in the final semi-structured one-on-one interview, during which the participant's technology use was discussed in depth with consideration of the contexts in which they occurred.

The data collection tools were central to the aims and design of the study. Interviews can be one of the strongest methods to explore young people's interpretations of their lives and to demonstrate how they make sense of and contribute to processes of society (Eder & Fingerson, 2002). However, the imbalance of power between student and researcher can impede discussion. Hence, the use of student background information (questionnaire responses) and patterns of technology use (technology diary) served as a catalyst for students to be active in the data collection process and provided stimulus for in depth and authentic discussions about technology use. The exploratory nature of the interview questions allowed students to offer their perspectives on a range of issues that were of importance to them and their practices.

7.3.1 Theoretical framing

The study design and analysis was guided by Bourdieu's (1986b) sociological theory to gain a critical understanding of students' use and value of technology in school and everyday life. Bourdieu's concepts of habitus, capital and field, which he describes as his "thinking tools," provided a lens in which to view practice (Bourdieu & Wacquant, 1989, p. 50). Formally, Bourdieu summarises this relation as: "[(habitus) (capital)] + field = practice" (1986b, p. 101). This equation, put simply, means that practice results from relations between an individual's dispositions (habitus) and their material and symbolic assets (capital), and position in a field within the current state of play of that social arena (field) (Maton, 2008). The concise equation highlights the crucial significance of Bourdieu's approach: the interlocking nature of the three elements.

In order to achieve a holistic understanding of student' technology practices, their practices cannot be adequately understood without consideration of the milieu from which young people cannot be separated. Thus, Bourdieu's concepts provide a theoretical lens with which to understand students' practices. More specifically,

Bourdieu's concept of habitus guides discovery of dispositions of the student; their capital and ability to manoeuvre and utilise these; in light of the various fields in which students operate provide insights into their perspectives and practices with technology.

The theoretical framing guided the design of data collection tools, including the questionnaire and interview questions, as well as being a crucial element in data analysis. The initial interview, technology diary and final interview data were coded according to Bourdieu's concepts of habitus, capital and field. Categorical aggregation was used to establish themes and patterns within these coded concepts to form a second level of analysis (Creswell, 2007). The findings are presented according to themes that emerged from the data, whilst the discussion explores the findings through a Bourdieuian lens and reflects on the theoretical contribution to our understanding of students' experiences with technology.

7.4 Results

Data was collected from the schools during the third school term of 2012. Both schools received resources and funding as part of the *Digital Education Revolution* and *Laptops for Learning program* (DEEWR, 2008), hence each student in years 9 and 10 had possession of a laptop issued by the school. This paper reports on the student case data set, specifically, data from the 12 student cases in the form of records from technology diaries and interview data conducted before and after the completion of the diaries. A broad overview of student use of technologies in everyday life and at school is presented first, followed by detailed accounts of students' experiences with and perceptions of technology.

7.4.1 Technology use outside of school

Students' technology use outside of school was dominated by communication and interest driven activities. Students used a range of applications to communicate with peers, family and friends, including social networking sites (SNS), mobile phones for calls and text messages, Skype and email. These communications were predominately used for everyday life purposes, and occasionally for communicating about school

related tasks. Playing games, listening to music, watching videos online and general internet browsing were also frequently performed outside of school.

Generally students' use of these technologies was habitual, performing very similar activities each day; and basic or passive uses, using the most rudimentary features of the applications. For example, Michael watched videos on YouTube everyday, however, did not use other features of the site like creating an account to subscribe to users or upload videos. He explained, "I don't have an account yet because I don't understand how to do it," (Final interview).

Students reported that they had few restrictions, by their parents, on their technology use at home. As Kylie explained: "Well they know that I'm on Facebook but they don't really have any rules. I used to when I was younger; they used to tell me 'Twenty minutes and you're off' but now they just let me do whatever" (Initial interview). One students' parents had forbidden her to use SNS before she was the required age, and one student had downloads limits.

Most students' parents used technology in the home, with only two out of 21 parents not using technology, as reported by students in the interviews. Half of the parents used technology for social purposes, seven for work related uses, five for leisure uses and four parents used technology for paying bills.

Technology uses outside of school for non-education related purposes were more frequent than those for educational purposes. Students' use of technology for education related purposes were largely extensions of work at school and for organisation. Figure 7 depicts the most frequently used technological applications for education related purposes outside of school.

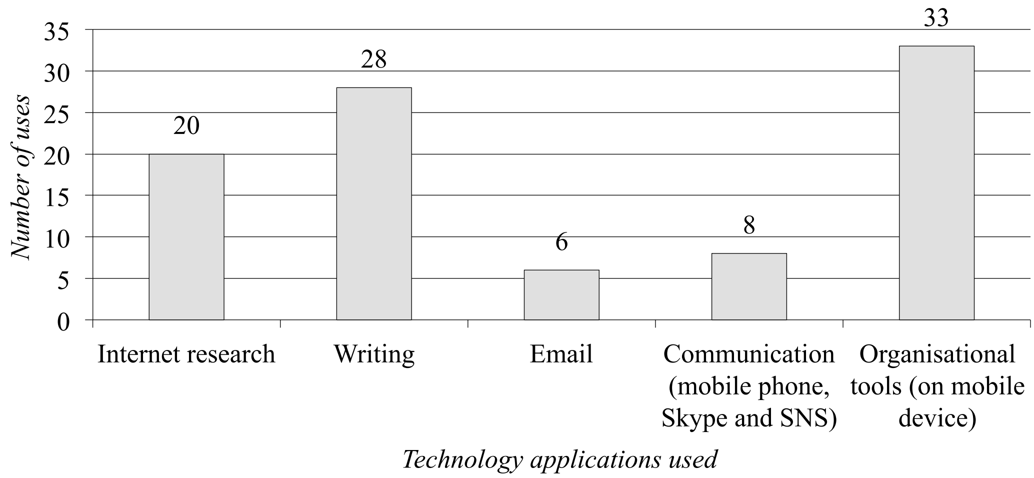

Figure 7 Frequency of use of technological applications outside of school for education related purposes over a two-week period, from 12 student cases, Student technology diaries.

Note: Applications with fewer than 5 uses among the 12 participants over the period have been omitted in this figure.

The most frequently used application related to education was the use of organisational tools, particularly by Year 10 students, including alarms to wake up for school and a timetable application to plan and prepare for the day's classes. Writing and internet research tasks at home were predominantly extensions of schoolwork either not completed during the school day or set as homework tasks or assignments by the teacher.

7.4.2 Technology use at school

A diverse range of digital devices were used at school including laptops, interactive whiteboards (IWBs), digital projectors (connected to laptops and handheld computers), desktop computers, video conferencing and smart devices including iPods touches® and smart phones. Through further discussion with students, it became evident that many of these technologies were seldom used and in fact school laptops were the most commonly used device for educational purposes, with students reporting that they used their laptops at schools most days.

Students used their laptops for a range of applications. Figure 8 presents data from students' technology diaries of the frequency of such applications. Writing and online research were unanimously the most frequent uses of technology at school reported by students, and supported by records in students' technology diaries over a two-week period.

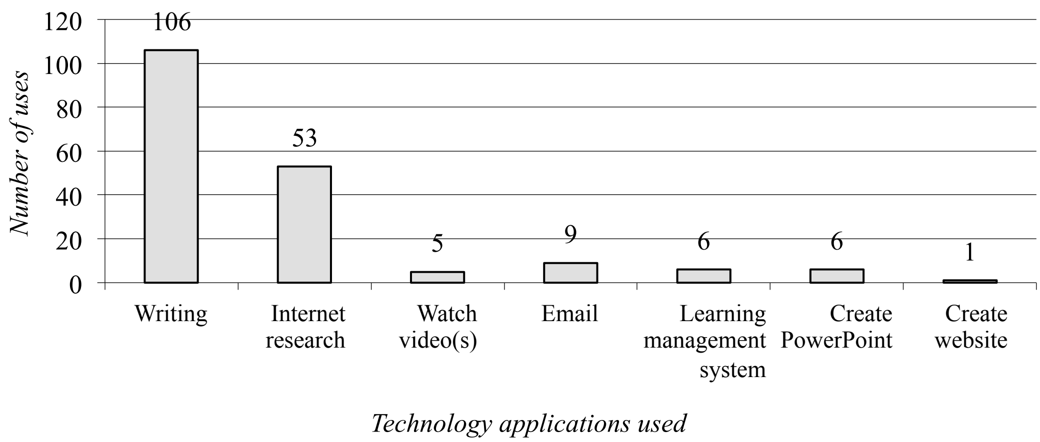

Figure 8 Total number of times students used technological applications at school for education related purposes over a two-week period, from 12 student cases, Student technology diaries

Data from student technology diaries provides evidence that students predominantly used technology for the consumption of information, rather than creation and publishing tasks. Tasks in which students interact, create and publish using technologies were rare. One student recorded in their technology diary creating a website and two other students making PowerPoint presentations.

While data on the kinds of technology and frequency of technology use at school provide a relevant snapshot of the current state of play, alone they insufficiently describe the nature of technology practices. Thus, the subsequent findings explore the implementation of technology for learning at school from the students' perspectives.

7.4.3 Learning with technology

Students' access to the internet, through the use of laptops, was the most common topic of discussion during the interviews; other uses of digital technologies also provide detailed accounts of technology use for learning.

Students go online

One of the main affordances, described by students in this study, of one-to-one laptops in class was access to the internet. All students in the student cases described conducting online research as part of their lessons at school, including locating information to answer questions provided by the teacher, finding pictures and diagrams to accompany notes taken in class or for assignments.

> They usually just write instructions on the board; in science at the moment we're learning about fossils so they might give you a list of fossils and they just say "Research how old they are, put a picture" – that kind of stuff. (Kylie, Final interview)

Laptops in the classroom provided students with a means to access the internet and thus access information. Students expressed that they valued this activity; they liked having instant access to information and the ability locate information from a range of sources and perspectives. As Bryon described, "I like the internet because instead of having to go through the textbook and find it all you can just quickly type it in and you have the answer straight away" (Byron, Final interview).

Students also reported that they believed access to the internet for information was the main reason they were issued laptops as part of the governments' one-to-one laptop program. As one Year 10 student explained: "well I reckon it's used for finding information – that's why they have them so you can just type to find information" (Lawson, Final interview).

The use of the internet, for both educational and everyday purposes, was a key point of discussion throughout the interviews. Access to the internet was of great value and importance to these students and it seems connectivity has had the greatest impact on their day-to-day classroom activities since receiving laptops. The subsequent activities reported by students demonstrate the use of technology with impact on their learning

experiences. It is important to note that these findings were not widespread in the data, but rather reported by a small number of participants or reported as infrequently occurring at school.

Personalised learning

Students discussed how they used technology to support their learning in class through personalising their learning experiences by supplementing their learning with online research. Three students explained that they experienced difficulties comprehending concepts being taught in class. In these cases, students described how they used the internet and videos, either in class if time was provided for online research, or at home, to clarify these concepts. These students described using the internet as a method to access information from a range of perspectives and visual representations to suit their personal learning needs.

> My teacher – he teaches us we have to listen and write down notes and sometimes... I'm not very good at listening so I… might go home and research DNA and stuff like that so I can understand it better and then I just might try and get ahead and try and understand concepts better. (Alice, Initial interview)

Unfortunately, students' descriptions suggest that teachers did not encourage personal variations, such as these, during lessons. None of the students described using technology in the classroom for educational purposes unless being instructed to. All technology used for learning in the classroom was directed by teachers, often with minimal options for students' personal choice. This suggests that their learning environments offer few opportunities for independent or personalised learning.

Increased variety in the classroom

Students reported that they used technology more frequently since receiving laptops compared to previous occasional visits to the computer lab. The data suggests that teachers too used technology more frequently, adopting a range of technologies to present lesson content, including the use of IWBs; laptops and handheld computers and projectors; and learning management systems like Moodle and Edmodo.

Students mentioned that teachers used IWBs, where available, and digital projectors connected the laptops or handheld computers in class to present lessons. However, most students had a passive role in these lessons: “It’s that kind of new thing that the teachers have been experimenting with over the last couple of years. Normally it’s the teachers using it” (Lawson, Initial interview). Only two students from the twelve student cases stated that they had actively used the IWB while at high school.

Watching videos was also identified as a technology adopted by teachers. Seven of the twelve students reported that teachers used ClickView and YouTube to present videos in class. Students described videos as an engaging, relevant and visual means of learning.

> I’d prefer if they used YouTube a bit more to give you examples of what’s going on. There are plenty of examples on YouTube like instead of just telling you about it they can show you how it actually happened. (Lawson, Initial interview)

Lawson continued, describing the effect of videos on his generations’ attention, advocating the incorporation of YouTube at school as a method to engage students, Every time you see the screen [students] automatically look up at it. Like at assemblies, when someone has a movie thing going on and the projector comes down, everyone has all eyes towards it; it just gets people’s attention, (Lawson, Initial interview).

Two thirds of student cases reported that teachers used learning management systems including Moodle or Edmodo to deliver lessons to students in the form of lists of questions to answer, hyperlinks or worksheets to download, or use them for students to submit their completed work for teachers to mark. For example, Byron explains, “Sometimes for geography the teacher sets work on [Moodle] and we just download it and do it” (Byron, Final interview).

While Moodle and Edmodo provide opportunities for interactivity, students did not report using these features. Students’ description of these activities begs us to question whether this is fundamentally different from a printed version of the same task on a piece of paper. Furthermore, data from students’ technology diaries, demonstrate that these social tools were used infrequently.

7.4.4 Students' perspective

Students' value of technology

Students described a range of technological devices and applications that they valued, although being connected was one theme that emerged as the most valued use of technology. Half of students reported that mobile technologies, including iPod, iPod touches and mobile phones, were devices that they could not live without. They described these devices as a way to be constantly connected to broader networks of peers, family, friends and information, through communication and access to the internet. As Drew and Michael described: "Well I like to always look at stuff and then I can see what's going on around me" (Drew, Final interview); "Just the dependence of it like communication. Because we're brought up with technology it would seem practically impossible to connect with people without it" (Michael, Final interview).

Students' value of technology for learning

Students commented that technology is a part of modern society and thus a necessity for them for learning and in preparation for the future. Ten out of twelve student cases described technology as being an invaluable source of information that had important affordances for their learning. On a more practical level, two thirds of student cases described using technology for efficiency. As Drew described, "[It's] quicker and we can research stuff quicker and we can get through the subject quicker" (Final interview).

Three quarters of students expressed that using the internet and laptop made tasks "easier" and "quicker" to complete. Students described being able to find information online quickly, and then easily copy the information into their own work without typing. It is important to note that writing and online research, were overwhelmingly the most frequent activities completed at school.

Of possible concern, four students explained that they felt typing had a negative impact on their learning, reporting that they felt they did not effectively remember lesson content when using their laptops to type, compared to using pen and paper. Abbey described her concerns,

> It's like I'm paying attention more to what I'm writing [when using a book] and it's just easier to remember. It's more manual work than just typing it up on a laptop and forgetting it. It's more like you're copying something; you're not actually learning it. (Initial interview)

This suggests that when students type notes or complete "copy and paste" activities in class they do not feel they are engaged in deep or meaningful learning. One third of student cases supported this point, stating that the nature of class work, often teacher directed online research or writing tasks, allowed easy completion so they could have free time at the end of the lesson.

The use of school-issued laptops, both at school and in their everyday lives, was a recurrent topic of discussion during interviews, and more importantly a topic with mixed responses. The data indicated that some students valued school laptops more highly than others. Interestingly the students who access to fewer technologies at home, Tilly, Alice, Kelvin and Kylie, described the school laptops as being very valuable to their learning.

> Probably my school laptop because I've got all my work on that; it's got direct access to all the school websites – you can get onto ClickView and stuff like that quite easy. The home one is not really connected with all that stuff. (Alice, Final interview)

While those students who had access to a greater variety of technologies in the home, used their school laptops only at school and seemed to focus their descriptions on the downfalls of the school laptops, as Amber describes,

> Mostly I use the home laptop because everything is blocked on the school laptops anyway. I can't even do most of my assignments or homework on there because it's blocked… The laptop is just quicker; it's easier to use than my school laptop. Pretty much I only use my school laptop when I'm typing up an essay or I'm just getting an assignment off my normal laptop onto my school laptop to use at school. It's hard to use at home, the school laptop. (Amber, Initial interview)

These mixed reviews of the school laptops suggest that not only are students' perspectives diverse, but are also influenced by a number of contextual factors, both at school and in their everyday lives that impact their use at school.

7.5 Discussion

The aim of this paper was to highlight students' practices with and perspectives of technology, situated within the broader milieu of their technology use. In this discussion we will consider students' descriptions of technology use through the lens of Bourdieu's three key concepts: field, capital and habitus.

7.5.1 How do students use technology in different fields?

Field is a spatial metaphor used by Bourdieu to define the structure of the social arenas and the individuals that occupy them. He describes fields as structured systems of networks of social connections, where individuals of varying positions manoeuvre, vying for stakes, resources and access (Bourdieu, 1990b).

Field is a crucial concept considering technology as a social tool that cannot be removed from the structures, cultures, practices, and relations that constitute its use in a particular field (Selwyn, 2012). The various fields in which students use technology is of significance as recent PISA data suggests that there is a stronger correlation between students' educational performance and their computer use at home, rather than their computer use at school (OECD, 2013). Thus, an understanding of students' practices in various fields, including the home, provides valuable insights to their technology practices at school for learning.

The findings in this study primarily comprised of two fields: school and students' homes. These fields each had defining objectified and embodied aspects that mediated students' technology practices. Thus, in order to conceptualise practices within these fields, generalised definitions of these two categories of field will be presented.

Generally, students' home fields were contexts where the family members determined the physical technological resources available and culture of technology use. Within the home, a majority of students reported themselves and their siblings as the primary users of technology. The findings also suggested that students had a relatively higher position in the home field, compared to the school field, in relation to technology use: with frequent use and generally few rules imposed by their parents. Thus, students' home fields were sites where they were autonomous in their technology use, using it when and

where they like, for social and leisure uses. Students also used technology at home, to a lesser extent, for education related purposes. While many students used technology to complete tasks set by the teacher, some students self-directed their learning at home, using organisational tools such as digital alarms and timetables to prepare themselves for school, as well as extending their learning from school.

Members within these home fields seemed to share in a common belief or opinion of the place of technology. Bourdieu termed this shared belief, doxa, an adherence to which determines membership of the field (Bourdieu, 1990b). Students expressed their belief that technology was an essential part of their lives. It is inferred that this belief was shared among the members of their home field through students' access to varied, but nonetheless adequate range of technologies, flexibility of access and some shared practices between members, most commonly for social and leisure. This belief mediated their independent use of technology, usually within the home field, where social and leisure uses of technology were frequent.

Conventionally, the school field is an institution with a long history of conservative practices and policies. The school field symbolises authority, where teachers occupy a higher position of power than the generally subservient students. The culture of technology use is bound by rules and practices of the school institution, which are well-entrenched doxical practices by years 9 and 10 of schooling. This was demonstrated in the findings where teachers largely dictated students' practices with technology, with many limitations enforced, including what classes they used their laptops, what programs were used, as well as the restrictions on online content accessible due to internet filters imposed by the education system. Students had few opportunities to make decisions or options for personalised learning.

Overall, the doxical practices and culture of technology use between school and home fields were generally very different. According to Bourdieu, as an individual moves between fields their ability to succeed is determined by the congruence of their habitus and capital with that of the dominant within the field, and their ability to utilise or gain capital in the field. While, the finding that students' technology practices at school and home are different is well established in the literature (Bourdieu, 1990b), Bourdieu

provides a means to understand these differences, as outlined above. Another researcher (Johnson, 2009a) also used Bourdieu's theory of field to investigate students' informal and formal learning across fields. Johnson's study revealed tensions between students' and educators' understandings of what constitutes learning the place of technology in this process. These rich narratives and understandings have significant implications for practice that extend beyond superficial pedagogical modifications.

These findings add detail to the growing body of research that investigates the nexus between home and school fields (Lee & Levins, 2010). However, rather than advocating the amalgamation of technology uses between contexts, we aim to understand students' practices in these fields, what skills and knowledge they bring to school (capital) and how this may influence their perception and practices at school (habitus).

7.5.2 What capital do students bring to and gain at school?

For Bourdieu, capital is the currency or power of the field, although does not relate exclusively to economic power, but instead encapsulates all forms of power, whether they are material, cultural, social or symbolic. Individuals and groups draw upon their economic, cultural, social and symbolic resources in order to assume and enhance their position in a field (Grenfell, 2009).

An understanding of the "knowledge and assumptions students bring to academic contexts from other aspects of their lives" (Bennett & Maton, 2010, p. 326) is critical to understanding students' practices and informing teaching and learning. This section of the discussion will consider students' capital in terms of their use of and experiences with technology in various fields. While it is acknowledged that Bourdieu details four kinds of capital, social, cultural, economic and symbolic, the scope of the student case study data allows for analysis of only social and cultural capital.

Cultural capital is a form of power gained through socialisation into practices, skills and knowledge and qualifications (Everett, 2002). In our case studies, students used and acquired cultural capital through developing competencies with technologies through use and interaction with agents of socialisation.

Students developed their cultural capital within the home field through investing a large amount of time in a range of technology based skills and knowledge. This training included creating and maintaining social networks through the use of SNSs, email and other forms of communications, and developing skills and knowledge required for gaming and internet browsing. The time invested in these practices, provides students with cultural and social capital through technological skills and knowledge and relationships formed. In schools, attempts have been made to utilise students' cultural capital within formal learning through the use of learning management systems like Edmodo, to mirror SNSs. However, our findings indicate minimal uptake by students and impact on learning. This suggests that students do not profit, or perceive the benefit from the use of such technologies in the school field.

The findings highlight a number of potential problems associated with students' cultural capital as they moved between home and school fields. The data demonstrated how students' varied cultural capital had the potential to both reproduce inequalities and enhance success.

Students' socialisation of technology use through exposure and interactions with peers, family and teachers was generally basic demonstrating reproduction of students' cultural capital. The findings indicated that students' use of technology in their everyday lives and at school, while generally very different, could both be characterised as basic and habitual. Most students' technology diary records and interview data described practices in both fields as routine, following a similar pattern each day and week; and generally engaging in low-level skills and knowledge. Findings reporting students' use of technology at school was dominated by consumption of information and rather than the creation of content. Similarly, findings on students' use of technology in their everyday lives, while centred on participatory media, suggest it is used in a fairly limited scope. This finding supports current research that indicates that participatory technologies are a large part of students' everyday lives (Manca & Ranieri, 2013), but also challenges widely held beliefs that students demonstrate sophisticated skills and knowledge with technology (Prensky, 2001). This finding supports a growing body of literature that suggests many students' technology use is quite elementary

(Kennedy, et al., 2010), but also demonstrates that students' socialisation, or exposure to technological experiences in both fields was overall basic.

In our case studies, students also described concerns that online research tasks had a negative impact on their learning. Students' descriptions of their 'copy and paste' practices when completing online research suggests that they do not possess the skills and knowledge, or cultural capital, required to critically engage in the task. Using a Bourdieuian lens to understand students' engagement with tasks, contributes to a growing body of research that suggests students' use of the internet for information seeking can be influenced by a range of factors including SES and networks of support (Eynon & Malmberg, 2011). For students who do not possess the cultural capital required to complete these tasks, the gap between them and their capable peers is perpetuated. And according to Bourdieu, one's capital can be further magnified by their social capital.

Bourdieu defined social capital as a symbolic form of capital manifested through resources linked to social networks of contacts and support (1990b). Social capital only has currency when acknowledged and valued by those of the network in the specific field. Moreover, social capital magnifies other forms of capital (Grenfell, 2009).

As discussed previously, many students invested a significant amount of time creating and maintaining online networks of contacts and supports. For some students these networks were a means to enhance their social capital through staying connecting, improving relationships and gaining information. However, it could also be inferred, that for other students, having fewer contacts or being excluded from these networks has the potential to magnify the inequalities in their capital.

Students' use of their laptops at school to access the internet is an example of the connectedness of these forms of capital and how social capital can magnify cultural capital. Indisputably, in this study, the biggest impact upon students' learning experiences at school and cultural capital was the ability to connect to the internet in the classroom. Students described how access to the internet provided them with connection to vast amounts of information, perspectives and modes of learning; and moreover their access was something they valued highly for educational and other purposes.

In a society where 87% of households are connected to the internet and a growing number of people are accessing the internet via mobile devices (Ewing & Thomas, 2012) it is no surprise that the state of being connected is valued over the particular device that supplies the connectivity (OECD, 2012). However, the importance of connectivity reaches beyond the ability to access information online, but more importantly opens opportunities for individuals' "seizing the opportunities that connectedness offers" (OECD, 2012, p. 15). With this in mind connectivity can be viewed as a form of cultural capital acquired through practice and training, and as a form of social capital (Bourdieu, 1986b) as individuals may profit on a social level through networks of contacts and supports. Thus it is important to consider, the state of being connected does not necessarily result in a gain in capital. Without the skills and knowledge or training required to effectively (to utilise and possibly gain capital) use the internet, or the support networks to provide assistance, one would not have the capital to benefit from connectivity. Thus, educators have a role to play in supporting students through a thorough understanding of the successes and challenges students experience when engaging in online tasks.

7.5.3 How does habitus shape students' practices?

Habitus *is* one of Bourdieu's most commonly adopted concepts, and one that is often misused in empirical research and highly criticised (Maton, 2008). Habitus is defined by Bourdieu as the 'durably inculcated system of structured, structuring dispositions' found within a field and embedded within the individual (Bourdieu, 1990b, p. 52). Habitus is *structured* by individuals' past and present circumstances, such as family background and educational experiences. It is *structuring* as an individuals' habitus helps to shape their present and future thoughts and practices (Maton, 2008).

The concept of habitus is bound to the field, thus both the field and the social agents within the field and how they contribute to and evolve the field is crucial to establishing an understanding of an individual's habitus (Maton, 2008). Interviews with students offered insights into their circumstances and past and present experiences with and without technology at school and in everyday life. The findings presented in this article can be used to reflect upon how they may shape students' habitus, that is, their perceptions, value of and practices with technology. While habitus encompasses more

than just experiences and perceptions, the scope of the study and the data collection methods limit the definition of the habitus of these students, highlighting challenges associated with analysis of habitus (Maton, 2008). Rather, descriptions of students' dispositions towards technology use and learning with technologies are offered.

Students' circumstances including their access to technologies within their homes were varied. The findings indicated that students with access to fewer technologies in their home field exceedingly valued their school-issued laptop. Therefore, the material resources available in students' home fields impacted upon their habitus and practices with their school laptops.

The range of students' technology practices in their everyday lives demonstrates that their dispositions towards technology for leisure and socialising are varied. Students had different preferences for the kinds of technologies they used (or preference not to use technology) based on their interests. Furthermore, through discussion of what technologies students valued they first and foremost perceived and valued technology as a social or leisure tool over a learning tool. Students' doxa and past and present experiences with technology in the home field, where social and leisurely use of technology prevailed, could explain students' dispositions.

Overall, the most commonly valued and use of technology was for socialising, using phones and computers to communicate with peers and family. Half the student cases described this use of technology as something they could not live without. The use of technology for communication for these students and perhaps for society in general, is a unifying cultural code or collective habitus (Everett, 2002).

Students' perceptions of technology use and recollections of their use at school provided insights into how their habitus has been structured. Students recalled relatively basic uses of technologies used over their time at high school, which centred on teachers' presenting materials and occasional visits to the computer lab. Considering these past experiences with minimal use of technology at school it could be inferred that these have shaped students' doxa, how they perceive and used their newly acquired laptops in the classroom. Students' present experiences with laptops at school continue to shape students' perceptions of technology. One example of this is Lawson's understanding of

the purpose of the laptop initiative, to provide access to the internet, perhaps shaped by the prevalent use of laptops for online research in the classroom.

Students' also expressed clear, yet varied, dispositions towards the use of technology for learning. The most common preference shared among the twelve student cases was the use of videos for learning. Students described videos as an effective and relevant means of learning. Significantly, watching videos was a technology that traversed school and everyday life fields. Thus it is a technology that aligns with students' habitus. Students also had mixed preferences for the use of technology to write and store their schoolwork. Some students enjoyed the efficiency of using their laptops for these tasks, while others preferred traditional means and perceived the use of technology to type as too difficult or problematic. Another Australian study of secondary school students (Johnson, 2009b) investigating dispositions towards technology for learning also found variance between students' habitus. Students' varied habitus has implications for learning at school considering the findings depicted generally restrictive and controlled learning experiences at school. This leads us to question whether students' learning preferences are being considered in the school field, and the implications for students' learning.

An understanding of students' habitus, how their perceptions and preferences for technologies and learning have been formed by their past experiences and by their circumstances can provide an understanding of students' current and perhaps likely future practices with technology. In understanding Bourdieu's concept of habitus, it is important to note that habitus is not set, but evolves. Individuals' current circumstances and perceptions (at any time) are a product of their experiences. The decisions that we make are a product of our habitus, for our habitus has shaped our vision. Our choices then, in turn, shape our future possibilities. Experiences at school are one example of experiences that may shape a students' habitus. With this understanding of habitus as capable of evolving, it becomes evident that education may have a role to play in transforming students' habitus and bridge students' digital inequalities.

7.5.4 Implications for learning

Before considering the implications of these findings, we must acknowledge the limitations. Care must be taken when considering the implications for practice due the reliability of the self-reporting nature of the data; however, these were largely overcome through the triangulation of multiple data sources (Creswell, 2007). Issues of generalisability may arise due to the small sample size, although, the in-depth descriptions of case schools and student provides sufficient detail to allow for similarities and differences to be drawn.

The findings of this study highlight the value of in-depth investigation of students' practices through the students' perspective, to understand the complex relationships students have with technologies in their everyday lives and at school. This understanding is crucial to uncovering the successes and challenges arising from students' experiences with technology (Ellis, et al., 2011) and to ultimately inform teaching and learning experiences that meet the needs of learners.

Of possible concern is that education policies and schools are overlooking the opportunity for schools to expand students' experiences with technology in formal learning contexts (North, et al., 2008). Learning experiences that build students' cultural and social capital, more specifically to socialise students into technology use that is different from their practices at home, that expose them to skills, knowledge and a techno-culture to expand their horizons and prepare them for their futures were absent in the study. Moreover, providing students with capital and shaping their habitus may allow them to be capable and competitive in the digital society.

The findings of this study have demonstrated the worth of investigating students' perceptions of their technological practices in order to highlight the subtitles and complexity of their relationships with technology. Research that further investigates students' from varied backgrounds and exploring their family background and use of technology outside of school could contribute to the body of research from the student perspective.

The study embraced Bourdieu's theoretical constructs as a theoretical, methodological and analytical tool. Although, as demonstrated in the discussion the scope of data collection, that is students' self reporting and conducting the data collection within school contexts, limited the analysis of some elements of Bourdieu's theory. In order to more deeply engage with the theory, research that collects data from the fields in which practices occurs and from other social agents within those fields would provide deeper understandings of a broader picture of students' technology practices. Furthermore, research informed by sociological theory would add to our understanding of applying Bourdieu's concepts to students' practices with technology.

7.6 Conclusion

The investigation of students' perspectives of their technology use through a sociological approach has explored the nexus between students' everyday life and school fields. We propose that an understanding of students' experiences through a Bourdieuian lens may help to shape a new approach to teaching and learning that considers students' experiences, knowledge, perspectives and backgrounds. It is acknowledged that technology has not revolutionised education, but rather shows evidence of an evolution (Selwyn, 2011b). While government education policies worldwide have envisioned the place of technology in schools as a transformative tool for learning, research has indicated that this is not being reflected in schools. We argue, that school shave a role to play in bridging student inequalities by building students' capital and shaping their habitus (i.e. what they see as possible) through learning experiences with technologies. Ultimately, the culture of technology use within schools needs to change, to better prepare students for their current and future digital lives.

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CHAPTER EIGHT

Exploring the transformative potential of young peoples' technology practices in school

> "One cannot grasp the most profound logic of the social world unless one becomes immersed in the specificity of an empirical reality" (Bourdieu, 1993, p. 271).

Foreword

This paper is prepared for publication as **Beckman, K.**, Bennett, S. & Lockyer, L. 'Exploring the transformative potential of young peoples' technology practices in school' in the *British Journal of Educational Technology*. The *British Journal of Educational Technology* specifically invites papers detailing theories of educational technology. Therefore this paper is well placed to contribute to the current conversation proposing the application of Bourdieu's theory of practice in educational technology research (Mills, 2008; Oliver, 2013) and contributes empirical evidence from younger students (Czerniewicz & Brown, 2013). The paper is written in a concise format according to the journal guideline (4000 words) to present the application of Bourdieu's theory of practice to a specialist educational technology research audience in an accessible manner.

The purpose of this paper is to become "immersed in the specificity of an empirical reality" (Bourdieu, 1993, p. 271). To become immersed in specific detail within the confines of a journal format, this paper presents in detail three selected student case studies. Detailed accounts of these three cases facilitate the empirical reality for the

three students. Additionally, the in-depth case studies demonstrate the depth of analysis using Bourdieu's theoretical constructs. The paper provides detailed descriptions of students' technology practices, and uses Bourdieu's concepts of field, habitus and capital as a lens through which to understand students' practices with technology.

The three selected cases presented in this paper were purposefully selected as exemplary cases to represent the range of technology users within the 12 student cases, based on the following criteria:

- Access to technologies in the home
- Family structure
- Parents' occupation (refer to Table 5 in Chapter Four for an overview of the first three points for all 12 student cases)
- Technology use and overall disposition toward technology.

The selected cases included a high-frequency (Lawson) and a low-frequency user (Alice) and one distinctive case user (Regan). While these three cases are representative of the student cases, it is also acknowledged that students' technology practices were personal. Thus some nuances from the remaining cases, though presented in the previous chapter, may be omitted. For this reason a fourth student case, that of Byron (another high-frequency user), is included as a conference paper in Appendix C. This paper was published in the proceedings of the *World Conference on Educational Multimedia, Hypermedia and Telecommunications 2014* (Appendix C).

Overall, the diversity in these students' backgrounds and technology practices illustrates the complex nature of technology practices and highlights the utility of Bourdieu's concepts in educational technology research. The previous chapter explored the application of Bourdieu's theoretical constructs to technology practices. The paper provided evidence for the conceptualisations of technology specific practices in relation to field, habitus and capital (presented in Chapter Three). The details of the three student cases allows for a deeper exploration of field, habitus and capital and the associated technological manifestations. Thus, the evidence presented in these chapters demonstrates technology specific manifestations of field, habitus and capital and elaborates Bourdieu's theory in its application to educational technology research.

8.1 Abstract

This paper proposes that research in the field of educational technology would benefit from a sociological framing that pays attention to the understandings and lives of learners. The paper reports on a qualitative embedded case study of students in Years 9 and 10 in two Australian secondary schools. In-depth case studies of three student cases illustrate the complex nature of students' experience with technologies. Bourdieu's concepts of field, habitus and capital are used as a lens through which to view and understand students' experiences and relationships with technology. The findings demonstrate the utility of sociological theory in educational technology research. Furthermore, the findings can inform an approach to teaching and learning that considers students' varied experiences, knowledge, perspectives and backgrounds relating to technology.

8.2 Introduction

Technologies are tools used by individuals, and thus are innately social tools. Therefore, an understanding of an individual's technology practices cannot be removed from the structures, cultures, practices and relations that constitute its use (Selwyn, 2012). However, much educational technology research has been criticised as adopting a deterministic approach by focusing on the affordances of technologies and the effects on teaching and learning "with little or no concern for the 'wider' aspects of education and society" (Selwyn, 2012, p. 82).

This paper proposes that the field of educational technology research would benefit from reconceptualising how we approach technology in education, moving away from common-sense understanding and deterministic views and towards a theoretically guided approach (Bennett & Oliver, 2011; Oliver, 2013). Sociological theories have been used to explore the complexities of practice with consideration of context (Selwyn, 2012). Bourdieu's sociological concepts are one example that may be applied to educational technology research. The concepts of field, habitus and capital (Bourdieu, 1986b) are helpful for two reasons. First, the theoretical constructs consider the social context in which students' practices with technology occur. Second, examination of

technology practices through the theoretical concepts suggests potential transformative practices by highlighting inequalities between individuals and institutions (Mills, 2008).

8.3 Theoretical framing

The findings reported on in this paper are part of a broader study that investigated students' practices with technologies at school and in their everyday lives. The study was guided by Bourdieu's sociological concepts of field, habitus and capital, which are theoretical and methodological tools with which to understand practice. Bourdieu summarises the relational nature of these concepts as "[(habitus)(capital)] + field = practice" (Bourdieu, 1984, p. 95). More specifically, field is a spatial metaphor for the structure of the social contexts and the individuals that occupy them. As an individual moves between fields, they occupy various positions within those fields based on the congruence of their habitus and capital with that of the field. Habitus is defined as the inculcated "system of structured, structuring dispositions" of an individual (Bourdieu, 1990b, p. 52). More simply, it is the way an individual acts, feels and thinks, which is shaped by their past and present experiences and circumstances (Maton, 2012). Finally, capital is power. This does not relate exclusively to economic power, but instead encapsulates all forms of power, including cultural and social. Individuals and groups draw upon their economic, cultural and social capital to assume and enhance their position in a field. Of particular relevance to this study is social and cultural capital. These forms of capital relate to the socialisation of an individual with the dominant individuals of the field (cultural capital) and social connections and supports (social capital). Collectively, Bourdieu's concepts allow us to understand an individual's practices by considering their experiences, circumstances and means within the social milieu in which practices occur.

The few educational technology studies that have adopted a Bourdieuian approach have demonstrated their utility in progressing beyond descriptions of practice and towards understanding. Bourdieu's concepts have been used to understand the influence of an individual's family background on their technological practices. An example is an investigation of the influence of students' socio-economic circumstances on their technology related habitus or capital (North, et al., 2008; Robinson, 2009; Sutherland-Smith, et al., 2003) and familial experiences and circumstances on students' technology

practices (Cranmer, 2006; Hollingworth, et al., 2011). Sociological theory in these studies has provided valuable insights into the influence of students' backgrounds on their education.

Bourdieu's concept of field has been used to compare students' practices across fields. A case study of teenage technology experts used Bourdieu's theory to conceptualise the tensions between students' formal and informal learning with technologies in the home and school fields, highlighting differences in perceptions and expectations of learning (Johnson, 2009a). Similarly, a recent study focused on technology practices of higher education students as they manoeuvred between their everyday lives and the higher education field (Czerniewicz & Brown, 2013). The theoretical framing of these studies uncovered tensions between fields and practices as individuals operated in different fields.

These studies demonstrate how Bourdieu's concepts can be used to explore the complexities of an individual's technology practices. The study presented in this article adds to this relatively small body of sociological educational technology research. Through presenting three student cases from the study, these findings extend understanding of students' technology practices and augment the application of Bourdieu's theory in educational technology research.

8.4 Methodology

The study investigated secondary school students' technology practices in their everyday lives and at school. More specifically, the study conceptualised their practices according to context and explored how and why the students used technologies. The three student cases are drawn from a multiple embedded case study of students in two secondary schools (Figure 9).

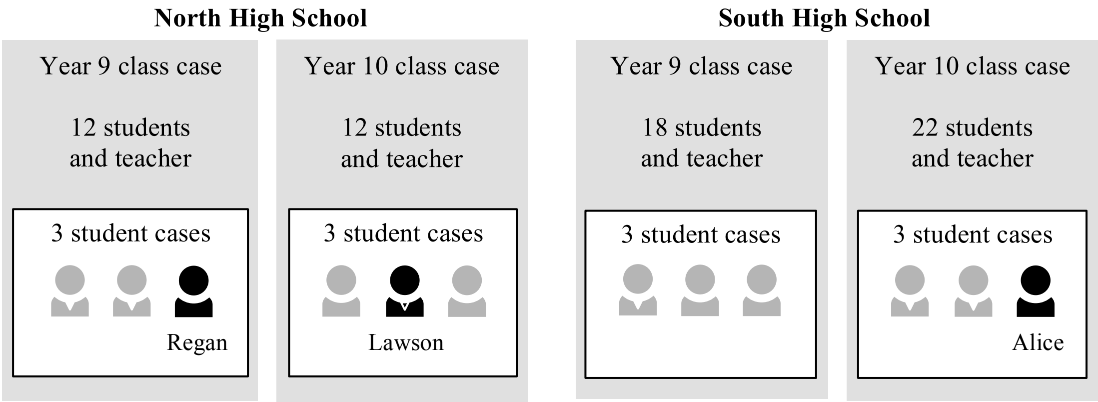

Figure 9 Multiple embedded case study design indicating selected student cases

The study involved four class cases from two schools in an Australian regional city. The class cases comprised students in Years 9 and 10 who were part of a government initiative providing students with laptops for educational use (New South Wales Department of Education and Communities [NSW DEC], 2012). From these four class cases, 12 student cases were selected through purposeful maximal sampling (Creswell, 2007) to include variation in students' family backgrounds and their access to and use and perceptions of technology.

This paper reports findings from three student cases, as indicated in Figure 9. These three cases were selected to portray the range of technology users within the 12 cases. The exemplary cases present a high-frequency user, a low-frequency user and one whose practices were distinctive from the sample. Their diverse use of technologies in their everyday lives illustrates the complex nature of students' practices and highlights the utility of Bourdieu's concepts in educational technology research.

Bourdieu's theory of practice shaped the selection and design of data collection methods to allow for examination of technology practices with consideration of students' backgrounds and circumstances, others' technology practices and perspectives (teachers, parents, siblings, friends), past and present experiences with technologies and other contextual structures. Multiple data sources were collected from each student case, including a technology diary in which students recorded all technologies used over a two-week period; this diary was framed by two one-on-one interviews. Categorical aggregation was used to establish themes and patterns (Creswell, 2007), which in turn

formed a coding framework that was used to analyse each data source. Following this, Bourdieu's theoretical constructs of field, habitus and capital guided a second line of analysis.

8.4.1 Participants

Regan, a Year 9 student, used technology frequently at school and in everyday life. She lived with her parents and two sisters. Regan used technology at school each day for learning and homework, but used technology at home predominantly for social and entertainment purposes. Regan's home use was relatively extensive compared with the other cases, in that she used a broad range of technologies.

Lawson, a Year 10 student, lived with his mother and older sister. All members of his family used technology regularly, although Lawson reported that he used technology the most. Lawson's practices were routine, usually checking social media in the mornings and then spending most afternoons multitasking between social networking and browsing the internet.

Alice, a Year 10 student, lived with her parents and two sisters. She used technology infrequently at school and home. She preferred to write in her notebook at school and only took her school-issued laptop when required under teacher instruction. Alice's predominant use of technology was for learning, and while she had her own laptop at home, she preferred to use the school-issued laptop. She had little interest in using technology for entertainment or socialising, preferring to communicate with her friends face-to-face. She perceived technology largely as a struggle: she had believed from an early age that technology was not for her and that it was difficult to use.

8.5 Findings

8.5.1 Practices according to field

The findings of this study indicated two predominant fields of technology practices: home and school. Students had access to a varying range of technological resources in their homes (Table 12). Each student had access to a computer with internet access and was able to use it in their preferred location within the home. In the initial interview,

Regan explained she preferred to use technologies that allowed her to be mobile, such as a laptop, an iPod Touch and a mobile phone. Lawson, too, enjoyed the mobility of his iPod Touch, but predominantly used the home desktop computer, where he could multitask various applications and play guitar. Alice preferred privacy, using her school-issued laptop in her bedroom.

Table 12 Overview of student cases and technologies accessed at home

Student	*Regan*	*Lawson*	*Alice*
School	North High School	North High School	South High School
Year	9	10	10
Technologies accessed at home	School-issued laptop Laptop Internet Desktop computer iPod Touch Digital cameras Games consoles Mobile phone	School-issued laptop Internet Desktop computer iPod Touch Digital camera Game consoles Mobile phone	School-issued laptop Laptop Internet Mobile phone

Overall, students were able to use technology at home when and where they preferred. All had their own school-issued laptop and choice of a number of other devices. Furthermore, they stated that there were no rules that dictated their technology practices at home. For example, Lawson explained his mother's attitude: "She minds if I've got [school] work to do, but other than that she doesn't really care…. Normally I don't tell her" (Final interview).

The nature of students' technology use for school was more prescriptive than their everyday uses. For example, in the technology diary, Alice recorded that all uses of her laptop were under teacher direction, as were most of Regan and Lawson's recorded school uses of technology (89%). These findings suggest that there is a difference in the culture of technology use between everyday uses, where students were autonomous in their digital practices, and school, where technology use was more prescribed.

All three students used their school-issued laptops at school, although they had different perspectives on its use for learning. Regan and Lawson were enthusiastic technology users and used their laptops in almost every class, as detailed in the technology diary. Lawson explained, "You can just type to find information and then you can keep all

your books in one kind of…laptop" (Final interview). Alice preferred to complete her work in a book. She explained, "I don't bring [my laptop] extremely often to school. When I bring it, I'll get it out when I need it or when I'm told to [by the teacher]" (Initial interview).

8.5.2 Habitus

In this study, students' habitus was explored during the interviews through their dispositions towards technology use, family backgrounds and past and present experiences with technologies.

Dispositions

The students had varied dispositions toward the use of technology. Outside school, Lawson's tendency to socialise led him to spend hours using social networking sites like Facebook and YouTube. Regan was also inclined to spend hours communicating with social networks, using Twitter, YouTube and email. Lawson and Regan were confident and active in their use with these technologies. While Alice preferred to use the home telephone to communicate with her friends.

For Lawson and Regan, social and entertainment activities dominated their use of technology outside of school. Conversely, Alice's main use of technology outside of school was for learning, where she would complete homework and assignments when required, but mostly used technology to research concepts she had not sufficiently understood at school.

There was also evidence that students' use of technologies in their everyday lives structured their dispositions towards the use of technology at school. Lawson's and Regan's frequent use of technologies in their everyday lives seemed to influence their acceptance of technology use for learning, while Alice's preference not to use technology at home was also observed in her perceptions of technology use at school. For example, she preferred not to type her school notes on the laptop and did not value interactive technologies for learning. For example, she recalled, "Some people got to go up and use [the interactive whiteboard] but I didn't because I didn't want to and I didn't find the point" (Initial interview).

These findings demonstrate how students' habitus, developed within the home field through socialisation to particular technologies and uses, shaped their perceptions and use of technology at school. More specifically, these dispositions – specifically, the value Lawson and Regan placed on technologies for socialising and Alice's tendency not to use technology – may be influenced by experiences and circumstances outside school (family backgrounds and past and present experiences with technology).

Family background

Students' family backgrounds, including family uses of technology at home, provide insights into the structuring experiences in which students were involved. These experiences influence the ways students act, feel and think, and thus the degree to which they perceive technology practices as possible, probable or profitable.

In Regan's home, all members of the family used technology, "pretty much every day" (Initial interview). Her parents, a librarian and marine biologist, used technology for email and to write reports for work, and her sisters used technology for school and university study, as well as for socialising and leisure. Regan's practices with technology suggest that her family circumstances and experiences have shaped her positive and receptive disposition toward technologies. Lawson's mother, an office administrator, used technology for paying bills, as well as using Facebook and playing games. His father (with whom he did not live) used his mobile phone for work and the internet for interest related browsing, and his sister used technology for study and for social and entertainment uses. These interest driven uses suggest that his family had socialised him into practical, educational, social and leisure uses of technology. Alice's parents, an office administrator and plumber, did not use computers at home, and she wasn't attentive to her sisters' practices. This suggests that Alice observed fewer uses of technology in her home and thus had more limited technology experiences, shaping her reluctant and apprehensive disposition.

Past and present experiences

The participants' first technology experiences seemed to have had an enduring influence on their current practices. In the initial interview, students recalled when and how they first used computers. In all three cases, most technology related learning experiences

were at primary school or influenced by family, particularly older siblings. Lawson described learning how to use Microsoft Word and Google in primary school. He also described his older sister teaching him how to use Facebook and his father demonstrating internet search skills. Regan first used a computer with her older sister to play games and use a paint application. Regan recalled watching her sister use technology, which prompted her to try. Alice explained the challenges she experienced getting access to the family computer, "we had a desktop computer when I was young and I remember using that for games…that was the only computer, so I didn't get to use it a lot" (Initial interview). She explained this computer was shared among her sisters and they were more persistent in their use of this computer. These first experiences for each participant were sustaining, influencing their habitus. Lawson's current technology experiences were centred on social uses, whereas Regan's family continued to influence her practices to use technology for a range of educational, leisure and social purposes, and Alice's preference not to use technology was influenced by her limited experiences.

All three students described rarely learning new technologies at high school. They explained that teachers "just assume[d]" they had technological skills and knowledge (Alice, Initial interview). For Alice, this assumption was unfounded, as she was reluctant to use technology and had limited home experiences to draw on. For example, Alice had a laptop at home, yet preferred to use her school laptop to access educational online resources. She described her difficulties in accessing the online resources through the school intranet: "I could probably do that with my home laptop but it's harder" (Initial interview). Conversely, Lawson and Regan reported their aptitude with technologies. Lawson explained how he "just picked it up" (Initial interview) when learning a new technology. This suggests a self-confidence that may facilitate future uses of new technologies.

8.5.3 Capital

In this study, students' capital was evidenced in their socialisation into technology use through experiences with teachers, family and friends and time spent developing skills and knowledge to distinguish between legitimate and illegitimate uses of technology according to field, particularly uses of relevance in the school field (cultural capital), and in their social connections and supports for their use of technologies (social capital).

Students' cultural capital was acquired through socialisation into technology practices through interactions with others. The technology practices of parents, siblings and friends influenced students' practices. For example, Regan was exposed to a range of technological uses at home for work, education, socialising and entertainment, which were used frequently. For Regan, this exposure and familial habitus provided her with cultural capital, some of which had currency in the school field. Lawson's family used technology for everyday life purposes: social, education, entertainment and paying bills, with his father occasionally using technology for work. Therefore Lawson's socialisation into technological practices through family could be described as more limited in scope than Regan's. More limited still were Alice's family's uses of technology, resulting in Alice's more limited cultural capital with technologies. Alice's limited cultural capital was further evidenced in her preference not to use technology for learning and the difficulties she experienced with using technologies. These findings demonstrate how cultural capital may shape a students' ability to deploy certain skills and knowledge to engage with technologies in the school field.

Students reported minimal opportunities at school for formal learning of technology related skills and knowledge (a form of socialisation that may shape students' cultural capital). Regan and Lawson believed that they could learn any new program, and thus taught themselves by investing time in learning technologies, which further developed their cultural capital. However, for Alice, where school was her main field of socialisation into technology practices, the lack of formal learning experiences could be problematic. Alice described one learning experience at school that positively shaped her cultural capital, where she described learning to access online educational videos. Learning to access educational videos at school shaped Alice's cultural capital, as she reported improved learning outcomes, thus shaping her perceptions of technology practices that are possible and profitable. She valued this learning experience at school, and this in turn led to her watching educational videos at home to review concepts learnt at school.

Students' social capital was diverse, with each student having different networks of contacts that supported their use of technology. Lawson and Regan were active social networkers. Lawson gained social capital by using Facebook before and after school to

keep up to date with news and events of his school peers. Regan used online networks to access social capital not attainable through her local networks. She had international pen friends via email, and subscribed to international YouTube channels and Twitter personalities, "…like if they're from England…maybe they've gone to university…or they just make videos about what's happened in the week and just weird stuff like that" (Final interview). Regan's online networks provided opportunities to capitalise from connectivity by engaging with networks that provided her with new ideas, inspirations and aspirations. These experiences developed Regan's social capital generally and exposed her to a techno-culture of creating and sharing online. Alice did not use or create online networks, only occasionally looking at Facebook. Alice had one social contact, a school friend, with whom she developed her technology skills and knowledge. Alice frequently visited her friend's house on weekends, where they used a range of technologies, including video games and social networking. These experiences at her friend's home exposed Alice to technologies and practices that she may not have otherwise accessed.

These findings highlight the magnifying nature of social capital on other forms of capital. For Regan, her far-reaching networks of technological contacts and support, through her family and online, may amplify her cultural capital through time invested in use and socialisation into broader technology uses, while Alice's limited networks had a reinforcing effect on her limited exposure to technologies.

8.6 Discussion

These cases demonstrate the complexity of students' technology practices, with variations in students' circumstances, dispositions, perceptions and, ultimately, practices with technology. This paper now considers the practical implications of technology use in formal education through exploring students' backgrounds and perceptions of technology and the transformative potential of particular technology experiences as conceptualised through the theory of practice. However, it should be acknowledged that the three cases presented in this paper are not representative of students' technology practices in other contexts. Instead, these case studies serve to demonstrate the variation of practices within the broader sample of this study. The self-

reported nature of the data also depicts a subjective account of students' fields and practices, and thus limits the researcher's ability to objectively analyse fields.

In this paper we have used Bourdieu's concepts to demonstrate how an individual's circumstances, family background and past and present experiences can structure their habitus and capital, and thus their practices. While research investigating students' backgrounds in relation to their education may be familiar, few studies have used Bourdieu's sociology to explore aspects of students' technology practices in this way (Hatlevik & Christophersen, 2013; Tondeur, Cooper, & Newhouse, 2010). In the three cases presented in this paper, students' family backgrounds provided them with socialisation into technology, shaping their ability to distinguish and deploy particular uses of technology in various fields (cultural capital), which influenced their habitus and ultimately their practices with technology for learning. From the three cases, Regan shared experiences with a range of agents of socialisation (social capital) into technology use, including her parents, siblings and online networks; all of these experiences contributed to her cultural capital and were magnified by her social capital.

Some experiences are more profitable than others, as capital is only of value when recognised by the field (Bourdieu, 1990b). For example, Lawson described experiences with his sister using social networking and his father teaching him research skills. While both are examples of socialisation and improvement in technological skills and knowledge (cultural capital), only the latter has currency in the school field. This finding is consistent with a quantitative study of students' technology related cultural capital, suggesting a correlation with parents' professions (Tondeur, et al., 2010). Parents' professions may be an indicator of the technology related attitudes, technology use and skills and knowledge within the home, with the professional circumstances of the parents shaping children's socialisation in the use of technology and alignment with that of formal education (Tondeur, et al., 2010). These findings have important implications for students' ability to appropriately and successfully engage with technologies at school based on their alignment or misalignment been home and school technology practices. Comparison of these cases suggest that students who have exposure to a range of uses of technology (inquiry, communication, creation, entertainment and management) are more likely to successfully appropriate their use in their school technology practices.

It is also important to note that habitus is not static, but continuously structured and restructured through one's experiences (1990b). Therefore, present and future experiences with technology at school have the potential to restructure students' habitus – their perceptions of technology, and what is possible and profitable. Thus, teachers may contribute to students' cultural capital, being agents for socialisation into technology practices and support for students (social capital), and in turn potentially shaping their habitus. A recent study detailed the transformative influence of teachers on students' technology practices (Pullen, 2015). The study demonstrated that teachers' use of presentation technology tools and teaching about the use of these technologies shaped students' development of their skills and knowledge and use of the technology outside of school. In this study, Alice's experience of learning to access educational videos online at school is one example of the transformative potential of teachers.

Unfortunately, the findings of this study suggest that this kind of transformative experience in schools was rare, with students reporting mostly basic and prescriptive uses of technology. This is of concern, as such technology experiences do not consider students' varied habitus and capital, and thus may not align with students' learning needs or dispositions towards technology. Moreover, students' current technology practices in school suggest a lost opportunity to build cultural capital that reaps benefits for both school and home practices. While differences between school and home uses of technologies have been well documented, considering the varied structures in these fields may provide an avenue for better informing teaching practice (Lee & Levins, 2010). More specifically, an understanding of the field structures that shape technology practices may provide opportunities to better inform how technologies are used in school; for example, providing opportunities for students to make decisions about their use of technologies and providing support for students in the use of technologies that may be different from their experiences in their everyday lives.

Bourdieu's concept of habitus provides valuable insights into students' perceptions of technologies and how these shape their practices. For example, Alice valued the use of educational videos, including extending her learning at home. The findings suggest that Alice valued this use as she profited academically from these practices; however, for

many other uses of technology at school, Alice did not perceive the possible capital that could be gained. She perceived technology largely as a struggle: she had believed from an early age that technology was not for her and that it was difficult to use. This shows how habitus can restrict individuals' perceptions of what practices are either possible or unthinkable based on their social class background (Mills, 2008). Though this study did not measure students' socio-economic status, students' access to technologies, parental occupations and technology practices provide some indication of factors relating to socio-economic status. For example, Alice's family had low access to and use of technologies in the home, associated with low socio-economic status. Similar studies have demonstrated patterns between low socio-economic status, negative student perception and limited resources that influenced students' modest engagement with technologies (Heemskerk, Volman, Admiraal, & Ten Dam, 2012; Vekiri, 2010). This finding advances understanding of the influence of students' perceptions on their practices.

An understanding of students' backgrounds and perceptions of technologies, conceptualised through a Bourdieuian sociology, provides potential for strategic use by schools to address student inequalities (Czerniewicz & Brown, 2013). The three cases presented highlight some personal and contextual factors that may facilitate or hinder students' practices with technology at school for learning. The reproductive nature of students' habitus was demonstrated in this study through students' practices conforming to their perceptions of and past experiences with technology. Conversely, we may also consider the transformative aspects of habitus and capital (Mills, 2008). A consideration of students' varied habitus and capital offers a transformative potential for schools to provide students with knowledge and learning experiences that broaden their perceptions of practices with technology, and thus to bridge student inequalities with technology practices for learning and expand all students' technology habitus and capital.

8.7 Conclusion

This study investigated students' practices with technologies at school and in their everyday lives. We have presented three in-depth case studies through the lens of Bourdieu's sociological theory to present a holistic understanding of students' practices that considered the influence of their backgrounds and sociocultural milieu. The findings add to the growing body of literature that acknowledges the complex nature of students' technology practices (Bennett, et al., 2008). Moreover, the lens of Bourdieu's concepts highlighted the social nature of technologies, where students' practices were inextricably linked to the contexts in which they occurred. The descriptions yielded from the three case studies demonstrate the value of sociological theory in educational technology research in providing deeper understanding with the potential to address student inequalities.

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CHAPTER NINE

Conclusion

Foreword

Chapters Five through to Eight reported on the research findings. Chapters Five and Six presented findings that characterised students' technology practices at school and in their everyday lives, while Chapters Seven and Eight presented data from the student cases that gave a more in-depth look at student practices, with the aim of elucidating the underlying logic of students' uses of technology.

This concluding chapter draws together the key findings of each paper. The key findings are synthesised and conclusions drawn by addressing the three research questions. Finally, the chapter presents a discussion of implications for practice and research, the limitations of the study and recommendations for further research.

9.1 Introduction

The purpose of this study was to investigate secondary school students' technology practices within the milieu in which they occur. The study aimed to extend educational technology research that describes students' practices by investigating how and why secondary school students use technology at school and in their everyday lives. To achieve this research aim, the study considered three research questions:

1. What are the characteristics of students' technology practices in their everyday lives and at school?
2. How do contextual factors influence students' technology practices?
3. Why do students use technologies?

The review of the literature demonstrated a deficit in the understanding of the complex and social nature of students' technology practices throughout their lives, taking into account their particular range of learning contexts and how their use of technologies fits into their everyday lives. A multiple embedded case study approach was adopted to yield rich descriptions and understanding of students' technology practices.

This chapter begins with a discussion of the study's overall findings by explicitly addressing each of the three research questions. Consideration of each research question is structured by the relevant key conclusions. Following this, the chapter presents a discussion of implications for practice and research, the limitations of the study and recommendations for further research.

9.2 Research Question 1: What are the characteristics of students' technology practices in their everyday lives and at school?

9.2.1 Students' technology practices in their everyday lives and at school were fairly narrow in scope, routine and basic

Each individual student used a narrow subset of technologies, despite a broad range of technology uses across the class and student cases. Individual students reported using specific technologies according to their personal dispositions. For example, entertainment related uses of technology in everyday life were the most commonly reported practices (Chapter Seven). These included practices such as playing games, watching videos, listening to music and reading e-books (Chapter Five). However, not all students engaged in *all* these practices, but chose combinations of selected practices based on their personal dispositions and purposes.

Students also used a narrow range of technologies at school. Students' technology practices generally involved internet research and making notes, supplemented by less frequent use of other technologies (Chapters Six and Seven). The narrow scope of technology use at school parallels international research indicating similar technology practices in secondary schools (Inan, et al., 2010; Kent & Facer, 2004; Lei & Zhao, 2007; Wang, et al., 2014). The findings are a contribution to contemporary research into secondary school students' school practices, particularly in the Australian context, for which evidence is scarce (Crook, et al., 2015). Furthermore, the time frame of this body of research indicates that students' technology practices at school have been far from revolutionised in the past decade, as demonstrated in Chapter Two.

Many of the students in this study used technologies in a routine manner, in that individual students performed similar patterns of technology use each day. At school, students routinely used their laptops to write and perform online research. Student case findings indicated that a majority of students conducted these practices most days at school (Chapters Seven and Eight). Students also engaged in routine patterns of daily technology use in their everyday lives (Chapter Five). Student case studies revealed that many students performed the same practices each morning or evening in a routine manner, so much so that they became habits. For example, Lawson routinely checked

Facebook and YouTube every morning and evening. These habitual uses included practices such as regularly looking at social media or emails, or listening to music involving a superficial level of engagement. These findings complement the findings of another case study of secondary students that described their routine use of technologies such as Facebook as “digital habits” (Gurung & Rutledge, 2014, p. 97). While these uses do not reflect the gamut of students’ technology practices, they do suggest that even though technology is ever present in students’ lives, its impact is not as significant as popular assumptions often made about young people’s use of technology. Through investigation of the nature of students’ technology practices, these findings together demonstrate the nuances of students’ technology use.

The students in this study generally used technology for relatively basic purposes. At school, teacher reports showed that the use of technology for learning was usually a minor or superficial part of the lesson. Findings from student case studies demonstrated that students most often used perfunctory features of many technologies; for example, making notes using word processing software, or viewing content on social networking sites such as Facebook or YouTube (Chapters Five and Six). But perhaps more significant were the technology practices not reported in these findings. Only a small number of students engaged in practices in their everyday lives or at school that may require higher levels of engagement such as creativity, critical thinking, evaluation or problem solving, and only infrequently (Chapters Six, Seven and Eight) (Australian Curriculum Assessment and Reporting Authority [ACARA], 2013c). For example, the findings showed only one instance of a student creating a website at school (Chapter Seven). Similar research on students’ use of technology at school also indicates that they rarely used technologies that allowed for creation or publishing of content (Inan, et al., 2010). These findings suggest that students’ regular technology practices at school are basic in nature and do not provide opportunity to engage in the practices that involve creativity, critical thinking, evaluation or problem solving that are associated with the intended learning outcomes for students in schools (ACARA, 2013c).

Evidence from the teachers’ perspective indicated that teachers assumed or believed students could or should be able to perform a range of sophisticated technology practices. Yet despite teachers’ awareness of a general lack of sophisticated technological skills and knowledge for educational purposes, the same kinds of basic

technology practices were reported in their teaching (Chapter Six). This presents a problem in light of the curriculum asserting that students should use technologies to create, communicate, investigate and manage (ACARA, 2013c). This raises questions about *where* students can acquire such skills and knowledge if they do not engage in technology practices characterised as “highly skilled” at school or in their everyday lives (Ministerial Council on Education Employment Training and Youth Affairs [MCEETYA], 2008, p. 5).

Overall, the regular technology practices of students in this study, across all fields, predominantly involved a narrow range of technologies used habitually in a relatively basic manner. However, this is not to say that students’ technology practices were uniform. Individual students’ technology practices were characterised as personal in the technologies used, their purposes, and preferences.

9.2.2 Students’ technology practices in their everyday lives were varied and personal

Students’ everyday technology practices were shaped by their dispositions. Participants in this study spent most of their time social networking (54%) and communicating using mobile phones (43%) (Chapters Five and Six). While this indicates some commonalities in use, the ways and purposes for which students used these technologies varied. Students used different combinations of social networking tools including Twitter, Facebook, Pinterest, Tumblr and Instagram.

Students had their particular profiles of technology use based on their selection of technologies to suit their particular purposes. Students used technologies for a range of broad purposes, including for inquiry, creation, communication, entertainment and management, but the composition of students’ technology practices varied according to purpose. Some students used technology predominantly for inquiry, while others favoured entertainment or communication uses (Chapters Six and Eight). But importantly, the rich descriptions from student cases in this study demonstrated subtleties of uses within categories. While students used technologies for similar purposes, their practices were personalised according to their specific purpose and choices. Technology use for communication was a practice shared by most students.

Yet students used a range of applications, including mobile phones, Facebook and email, in varied ways based on their preferences (Chapters Five and Six). For example, Lawson used Facebook to stay abreast of news from friends, while Regan used Twitter to connect with personalities outside her immediate network. Even students who used the same social networking tool engaged in varied practices. For example, some students used social networking sites to observe others' posts or comments, while others used it for private messaging or publishing posts (Chapter Five).

This shows that students used different applications for the same purpose, and used the same technology in different ways. Similar broad categories of technology use have been used to create student profiles or typologies of use (Eynon & Malmberg, 2011; Green & Hannon, 2007; Robinson, 2013). For example, a study of students' internet use developed four categories of users (normative, peripheral, active participator and all-rounder) according to the purposes of their practices (Eynon & Malmberg, 2011). Profiles and patterns of use such as these may be valuable in providing an overview of students' practices. However, these profiles may also produce a more narrow understanding, and thus potentially overlook the personal characteristics of students' technology practices.

This data demonstrates that there was no single profile of technology practices in students' everyday lives. These personalised uses are consistent with the idea that students' technology practices can be considered individual "niches" or "digital habits" (Gurung & Rutledge, 2014, p. 97). Case study evidence of secondary students demonstrated that these digital habits were based on personal choices and preferences related to music, popular culture and hobbies (Gurung & Rutledge, 2014). The findings of this study further demonstrate that students had the opportunity to make these personal choices about their technology use in their everyday lives, as they generally experienced fewer restrictions outside of school. The autonomy students experienced in their technology practices in everyday life reflect the increasing independence associated with adolescence (Davies & Eynon, 2013).

The study findings suggest that autonomy and varied use of technology did not apply to academic uses of technology in students' everyday lives. Student case study data indicated that these academic uses outside of school were limited to using the computer

to write and conducting online inquiry (Chapter Five). Thus, students' uses of technology for academic purposes were akin to their practices at school (discussed in detail in Section 9.2.3). A small number of students reported engaging in academic tasks that differed from those of the majority of students. These included using the internet to engage in additional study, communicate with friends about schoolwork and use alarms and timetable applications to organise themselves for school (Chapters Six and Eight). This evidence suggests that even though students were physically removed from the school context, their practices were still shaped by the school field. In fact, 38% of students reported that their academic technology use consisted of work set by the teacher (Chapter Six). This finding complements other research demonstrating the separation between everyday life and academic uses of technology (Harris, et al., 2013; Persson, 2014; Wang, et al., 2014).

These findings add to a growing body of literature indicating the diversity of students' technology practices (e.g. Eynon & Malmberg, 2011; Gurung & Rutledge, 2014; Smith, et al., 2013). Specifically, the findings highlighted the intricate detail and nuances of students' technology practices. These finer details, often absent in quantitative methods, were obtained through the exploratory open-ended questioning in this study. They make an important contribution to understanding students' technology practices through complementing large-scale studies and extending understanding provided by detailed evidence of student practices.

9.2.3 Students had varied preferences for technology use at school

Students' use of technology for academic purposes was largely teacher directed (Chapters Six and Seven). Students indicated that their use of technology during lessons was upon teacher instruction. Moreover, teachers and students reported rules that restricted the use of their laptops in class without teacher instruction (Chapter Six). Teacher control of students' technology practices for academic purposes extended to students' practices outside of school, where a majority of students indicated that their use of technology was to complete work set by the teacher. This finding suggests that students had little opportunity to make decisions about how they used computers for learning (Chapter Seven). This finding contrasts notions of student-centred learning afforded by technology (Inan, et al., 2010; Shaw, et al., 2013). However, it is unclear

whether teachers were the only factor that restricted students' technology practices in schools. Perhaps students' own dispositions (habitus) or their generally basic skills or knowledge (capital) also shaped students' limited technology practices.

Despite technology practices being largely under teacher instruction, students had varied preferences and perception of technology practices for learning. Some students valued the use of technology for learning for its efficiency and access to a wealth of information (Chapters Six, Seven and Eight). However, other students preferred to learn without technology and believed it was a distraction to learning (Chapters Six and Seven). For example, writing was a contentious topic: some students expressed strong preferences against writing using laptops, and perceived it to have an adverse impact on their learning compared to using pen and paper. While, other students perceived writing using laptops as an efficient method (Chapter Seven). This finding is consistent with another recent Australian study of teachers' and students' technology practices in five Australian secondary schools (Shaw, et al., 2013), which also demonstrated students' varied preferences for using computers for writing. Together these findings suggest that students' technology practices at school may not reflect their dispositions towards technology use for learning, which may have implications for their learning. This casts doubt on aspirations that young people should use technology for learning:

> To participate in a knowledge-based economy and to be empowered within a technologically sophisticated society now and into the future, *students need the knowledge, skills and confidence to make ICT work for them at school* [emphasis added], at home, at work and in their communities. (ACARA, 2013c)

However, the evidence of this study suggested there was no one specific way "to make ICT work" for students at school.

Evidence of students' varied dispositions toward technology use contributes to current understanding of students' perceptions of technology practices and the ways secondary students use technology at school. Research has demonstrated how variations in students' skills and knowledge with technologies shape their use of technology for learning (Calvani, et al., 2012; Robinson, 2014; Smith, et al., 2013). While many studies report on students' practices with particular technologies in schools, few studies consider students' perspectives on their use of technology for learning (Ellis, et al., 2011; Charles, 2012; Samuelsson, 2012). The findings of this study demonstrate that

student disposition toward the use of technology for learning also shapes students' practices with technology and consequently the effects their learning.

9.2.4 The research evidence challenges assumptions often made about students and technology

The diversity of practices identified in this study challenge common assumptions about technology and the ways young people use technology. These assumptions characterise young people as a homogenous generation with natural and instinctual use, disposition and capability with technology (Prensky, 2001; Tapscott, 1998). More recently, Prensky (2011) has reiterated the characteristics of his popular conception of digital natives, stating that the digital culture in which young people are immersed makes them comfortable with new technologies. However, this view makes another dangerous assumption: that all young people are immersed in a digital culture. Indeed, we all live in a digital society; however, the findings of this study demonstrated the degree to which students are immersed in the use of the technologies was also varied.

Until recently there was a lack of evidence to support or dispute these speculations (Hinostroza, et al., 2015). Studies in higher education have characterised the differentiated nature of tertiary students' technology practices (Corrin, et al., 2013; Kennedy, et al., 2010; Margaryan, et al., 2011); however, there has been a lack of research in this area on younger Australian students. The findings of this study add to a small body of literature that provides evidence that challenges these assumptions about secondary students (Calvani, et al., 2012; Sánchez, et al., 2011; Smith, et al., 2013). More specifically, the findings of this study demonstrated that students' technology practices were personal according to their dispositions. Similar findings were reported in a Chilean case study of secondary school students and their teachers (Sánchez, et al., 2011), which concluded that any shared traits among students were attributed to students' social groupings and interests. Thus, any patterns of use observed among students' technology practices were according to social and cultural influences, and not generational characteristics. The findings presented in this section, and elaborated in Section 9.3, demonstrate distinct variations in the digital cultures, and fields, in which young people are immersed.

At the same time, the place of technology in the Australian curriculum, as well as in the curricula in many developed nations, continues to receive increasing prominence (Organisation for Economic Co-operation and Development [OECD], 2013). In Australia, the national curriculum asserts:

> Information and communication technologies are fast and automated, interactive and multimodal, and they support the rapid communication and representation of knowledge to many audiences and its adaptation in different contexts. They transform the ways that students think and learn and give them greater control over how, where and when they learn. (ACARA, 2013c)

Based on statements such as this, it seems that assumptions about students and technology persist at the core of the national curriculum. However, many students in this study did not perform the skills outlined in the Australian curriculum, including creating, communicating, investigating and managing with technology at school or in their everyday life to transform their thinking or learning (ACARA, 2013c). Considering that students did not display these skills, nor was there evidence of students learning these skills at school, this raises concerns about the lack of opportunities for some students to acquire these capabilities.

9.2.5 Summary

Overall, the study findings demonstrated that students' technology practices were diverse and personal. The level of engagement with technologies also varied; however, a majority of technology practices were characterised as habitual and basic. Review of current literature exploring students' technology practices across their lives, detailed in Chapter Two and throughout discussion of the findings, demonstrates a deficit of research, particularly in the Australian context. Therefore, the findings of this study make a contribution to current understandings of the characteristics of students' technology practices.

The findings of the study demonstrated the complexity of students' practices through highlighting variations and subtleties in their practices. These nuances in students' practices, yielded through detailed descriptions of technology practices, revealed the relational nature between practice and aspects of the context (i.e. school or everyday life). Student case studies demonstrated a number of examples where students' practices

altered according to the context, as demonstrated in Chapters Five through Eight. The following section explores the influence of contextual factors on students' technology practices by theorising students' practices through Bourdieu's sociology.

9.3 Research Question 2: How do contextual factors influence students' technology practices?

9.3.1 Technology practices were shaped by field

The study aimed to develop an understanding of students' technology practices with consideration of the field in which technology practices occurred. To do this, the design of data collection instruments gleaned information about students' everyday life and school fields and systematically discussed details of student practices, including the location and purpose of, and others' involvement in, students' practices. The findings of the study indicated that students most commonly occupied two fields: school and home, although, as expected of this age group, students also used technology in other fields, including friends and extended family members' homes and online (Davies & Eynon, 2013).

Not only were students' practices personal and varied, so too were the fields they occupied. The review of current literature recognised the variations between students' everyday life contexts by demonstrating differences in the availability of resources and students' family backgrounds and practices (Chapter 2). More specifically, much of this research focused on specific aspects of students' home contexts, such as variations in access to physical resources (Barron, Walter, Martin, & Schatz, 2010; Eynon & Malmberg, 2011; Khan, et al., 2014; Kuhlemeier & Hemker, 2007; Robinson, 2014a; Smith, et al., 2013), regulation of technology practices, parents' education levels and others' technology practices (Eynon & Malmberg, 2011; Koivusilta, et al., 2007; Robinson & Schulz, 2013). This study considered the contexts in which practices occurred, taking into account various aspects of context including the physical, individual and social structures of students' homes, thus providing a more holistic understanding of students' home contexts. In doing so, the study demonstrated how field conditions, such as access to physical resources, culture of technology use, one's position in the field and doxa, shaped students' practices as they traversed fields.

Objectified field structures

Students' access to objectified field structures, specifically technology devices, shaped their technology practices. Despite all students having access to a school-issued laptop for use at school and home, the findings presented in Chapters Five and Seven demonstrated that access to reliable high-speed internet and additional computers and technologies was not equal. These findings are consistent with national and international patterns of access. Current data reveals that household access to computers is widespread in developed nations (OECD, 2013), and that 96% of Australian homes have internet access (Australian Bureau of Statistics [ABS], 2013b). However, these figures demonstrate that there remain a small number of homes and students without access.

Students' varied access to technology within the home resulted in diverse practices determined by the technologies available. While a majority of students in this study had access to some technology in their everyday lives, the quality (recency) and quantity (number and range of devices) of access was diverse, and consequently, their experiences with technology outside of school also varied. One example of this was a case study student with access to only her school laptop, which led to restricted uses based on the limited capability of the device (Chapter Eight). Chapter Five also recounted some subtleties of these objectified field structures, including internet download limits and out-dated devices shaping students' practices. This study provides further evidence that the access divide first documented in the 1990s has not disappeared, but shifted toward a disparity of quality of access (OECD, 2009; Selwyn, 2004).

The findings also demonstrated that access to devices did not guarantee use. The findings indicated that distribution of devices, sharing, time available to access devices and the location of devices shaped technology practices (Chapter Five). These findings are consistent with research demonstrating the influence of the type of internet connection and exclusivity of access on student practices (Smith, et al., 2013). Investigation of technology resources through Bourdieu's lens of objectified field structures allowed the study to consider more subtle aspects of access and demonstrate that access remains an influencing factor to technology practices. Thus, an understanding of the subtleties of technology access further explains how technology

practices are shaped based on limits of the technology resources available and accessible, and on the capability and reliability of devices.

Doxa

Students' practices were shaped by their beliefs and perceptions about technologies. Additionally, students' descriptions of field structures and others' practices, including those of friends and family, demonstrated that these beliefs and perceptions were often shared among others of the field. For example, Alice's family had access to fewer technologies than other case study students; her parents did not use computers, she didn't know of her sisters' practices and she was a reluctant user herself (Chapter Eight). This suggests that minimal use of computers may be an accepted norm in her family. This kind of unconscious shared sense of natural and accepted practices, beliefs and opinions is defined by Bourdieu as doxa (Bourdieu, 1977). Doxa underpins any field in that it ensures the stability of the field's social structures through individuals' shared sense of natural and accepted practices, beliefs and opinions (Deer, 2012).

The doxa of students' home and school fields were different (Chapters Five to Eight). Teachers, the dominant field participants, shaped the doxa of technology practices in the school field in that the doxa of the school field was to follow teachers' directions (Chapter Six). In this highly structured and hierarchical field, students' success depends on their unconscious understanding and acceptance of that doxa (Bourdieu, 1990b). Thus, students in this study conformed to the doxical practices of the school field, largely following the direction of the classroom teacher in their use of technology at school. Conversely, within students' homes the doxa was shaped by past experiences and shared, unquestioned opinions and perceptions about technology. The doxa of each student's home was specific to their family's particular circumstances. However, generally, the doxical practices were mediated by students' independent use of technology with few rules and restrictions, where social, entertainment and educational uses were accepted normative practices (Chapters Five, Seven and Eight).

Position in the field

An individual's position in the field determines their power, and ultimately their practices, in that field. Generally, students assumed a dominant position within their home fields. Many students described themselves as the most skilled, knowledgeable or interested in technology and as having priority of access to technologies over others and autonomy in their technology practices (Chapters Five and Seven). In fact, there were few cases where students' technology practices were dictated by their parents. However, another Australian study of secondary students indicated that students' parents controlled their technology use, despite students being more knowledgeable with technologies (Johnson, 2009b). Case studies of these expert students demonstrated how parents determined time allocated for the students to use technologies. These findings suggest the need for a deeper understanding of the power dynamics between students and their parents and how this shapes their technology practices in everyday life.

In the school field of technology practices, teachers held more power than students. The findings of the study demonstrated that teachers, who held a dominant position in the school field, had greater power in structuring the culture of technology use. Specifically, all four teachers, despite their level of technological skills and knowledge, controlled the use of technology in the classroom (Chapters Six and Seven). The school field, conventionally an institution with a long history of conservative practices and policies, symbolises authority, where teachers occupy a higher position of power than the generally compliant students (Selwyn, 2011b) and where the systems and structures are resistent to change (Hodas, 1996). The findings of the study indicated that the culture of technology use was bound by rules and practices of the school institution, which were well-entrenched doxical practices by Years 9 and 10 of schooling (Chapters Six and Seven). Another more subtle, yet important, point that determined the balance of power in the school fields was that technology practices were usually embedded in the curriculum. While teachers may not have been experts with technology, they were specialists in the curriculum and assumed authority. Thus, teachers' control of the curriculum limited students' ability to exert influence on or manoeuvre in their technology practices within the school field. This in itself reinforces the power structures of the school field. The shift of students' position across fields ultimately altered their practices; specifically, their control over technologies used, when they were used and the purpose for use (Chapters Seven and Eight). While many studies have

compared student and teacher practices, skills and perceptions of technologies (Crook, et al., 2013; Wang, et al., 2014), these studies do not consider the power dynamics between students and teachers and the implications for practice. However, applying a sociological view provides a different way to understand the positions and distribution of power relating to technology practices.

Investigation of the field provides a methodological tool and analytical lens with which to comprehensively understand the complex and relational nature of technology practices. Students' technology practices were inextricably linked to the field in which they occurred, as they were bounded by the objectified field structures, doxa and the students' position in the field. The findings of this study contribute to the understanding that students' practices with technology vary across fields (Ito et al., 2008; Lai, Khaddage, & Knezek, 2013). The theoretical framing of this study makes a contribution to the way these contexts are investigated.

This study moves beyond comparison of home and school or formal and informal learning environments, and thus adds further complexity to current research (Gurung & Rutledge, 2014; Kent & Facer, 2004; Robinson, 2014a; Voogt, Knezek, Cox, Knezek, & Ten Brummelhuis, 2013). The study findings demonstrated the subtle but formative field conditions that shape technology practices, moving beyond the expected dichotomy of home-entertainment and school-education practices. Some researchers have made recommendations to simulate students' everyday technology use at school to embrace the pedagogical affordances of such practices (Auld & Johnson, 2014; Lai, et al., 2013). However, the findings of this study have suggested that this is an inapt approach, as practices are linked to the field. Thus, unless field conditions are equivalent, similar practices and outcomes could not be expected. This is not to say that incorporating student technology practices from their everyday lives (for example, social or gaming technologies) within formal learning at school is an altogether futile endeavour. Yet, it is crucial to understand that the fields in which students engage in these practices are different and must be considered in the effective design of learning experiences. Therefore, the findings of this study make an important contribution to understanding technology practices and contexts by investigating field mechanisms, students' habitus and capital and how they influence students' technology practices.

9.3.2 Field mechanisms, habitus and capital shaped students' technology practices

An understanding of the "knowledge and assumptions students bring to academic contexts from other aspects of their lives" (Bennett & Maton, 2010, p. 326) is critical to understanding students' practices. Habitus allows an understanding of students' practices through understanding the origins of these practices and the reasons behind their dispositions and perspectives, while capital illuminates a students' ability to engage and succeed with technology practices for learning. As habitus and capital are interconnected with field, they will be considered through students' everyday life and school fields.

Everyday life fields

Students' homes were a key site in structuring their technology related habitus. The findings presented in Chapters Seven and Eight evidenced the formative and enduring nature of students' past experiences with technology in their homes. Students' first experiences with technologies were indicative of their current practices. For example, Regan learned to use applications by watching her older sibling (Chapter Eight). Findings of Regan and her siblings' similar current practices suggested that this supportive relationship remained. This was the case for many students, which suggests that their practices were shaped by their experiences and were often reflective of their parents' and siblings' perceptions and practices. These formative experiences also shaped students' perceptions of technologies; specifically, the purpose or place of technologies in their lives and their perceived value. The evidence also suggested that family circumstances shaped the technology practices of family members, in turn structuring the family doxa. For example, parents who did not use technologies in their work were less likely to do so at home, and if they did use technologies, they were likely to use them for entertainment or social purposes. This in turn shaped the accepted or normative practices within the home, and thus students were likely to use technology in a similar manner.

Bourdieu's emphasis on social class structures lends itself to the investigation of such factors. The findings support research by North, Snyder and Bulfin (2008), who demonstrated similar trends in the social backgrounds and preferred technology

practices of families. Drawing on Bourdieu's notions of social classes, they named this pattern "digital taste", observing that students from more affluent families tended to use technology for information or current events, while those from less affluent families tended to use the internet for shopping or socialising (North, et al., 2008). Additionally, a small number of studies have used Bourdieu's concepts to explore the influence of parents and family practices and perceptions (Cranmer, 2006; Hollingworth, et al., 2011), parental occupation (Tondeur, et al., 2011), class and socio-economic status in relation to students' technology (North, et al., 2008; Robinson, 2009; Sutherland-Smith, et al., 2003). The findings of this study add to this small body of research demonstrating the formative influence of family background and experiences being reproduced in students' perceptions, dispositions and practices with technology through their valuing of education and technology. Thus, students from families who value education and perceive technology as a tool for learning may be more likely to use technology in ways valued by the school field. This, in turn, may lead to the development of students' cultural capital.

Similarly, students' homes were a significant field where capital was acquired. Findings presented in Chapters Five and Eight demonstrated that the influence of the resources available in the home, exposure to technologies and technology practices of others were influential on students' technology practices. Parents and siblings taught students technology skills and knowledge, including how to use specific applications, and the ability to distinguish between the legitimacy of particular kinds of technological activities according to field (cultural capital) and providing varying levels of support (social capital).

The capital that students possessed varied, and so too did the alignment of this capital with that of the school field. Therefore, students entered the school field with varying levels of capital, in turn leading to varying levels of success. Similar research has demonstrated the relation between the home field and the development of capital that aligns with educational fields (Hatlevik & Christophersen, 2013; Hatlevik, et al., 2015; Robinson & Schulz, 2013). Specifically, one study showed a correlation between the digital competence of students and their parents' valuing of knowledge and learning (Hatlevik & Christophersen, 2013). Another study demonstrated how parents prioritised

the distribution of technology access based on the capital-enhancing potential of the practice (i.e. related to schoolwork or paid work) (Robinson & Schulz, 2013). These findings indicate the reproductive nature of possessing and acquiring capital within the family network.

Students also acquired social and cultural capital not attainable through their family network, through experiences with technologies in other fields. Students engaged with technologies (some of which were different to those used in their own homes) in a number of everyday life fields, including the homes of extended family and friends, in transit from school to home and online fields (Chapter Eight). Students also engaged with technologies in online fields that were distinct from their home field. Due to increasingly prevalent internet access in student homes, many students engaged in online networks, most commonly through social networking sites (Ellison & boyd, 2013). For example, Regan outlined the capital gained through engagement in a number of online fields on an international scale, including email communications with students, subscriptions to university related YouTube channels and Twitter (Chapter Eight). Engagement with others in these fields outside of students' homes may procure cultural capital through exposure to experiences, information and diverse cultures. However, evidence of students’ practices in these everyday life fields outside of the home was not common in the literature (Chapter 2). While some research, including this study, have sought to explore students’ practices in a range of everyday life fields, the findings predominantly feature technology practices at home (Baek & Freehling, 2007; Barron, et al., 2010; Bulfin & North, 2007; Gurung & Rutledge, 2014; Meneses & Mominó, 2010; Robinson, 2014a). It is unclear whether students do not use technologies frequently outside of their homes or whether the methodologies are limited in their ability to capture students’ practices in these fields.

Social capital, too, may be acquired through engagement in online fields, such as social networking sites. However, while some students may use social networks to develop social capital, those with fewer resources (physical and symbolic) may lack the capacity to form networks or capitalise on the experiences. For instance, Regan (in the previous example) possessed the cultural capital to seek and engage in social networks, while Lawson and Alice did not possess the same capital to either access or exploit such networks (Chapter Eight). Similar studies have shown that students from higher socio-

economic backgrounds were more likely to engage in online networks, while engagement by those from more disadvantaged backgrounds was limited (Khan, et al., 2014; Smith, et al., 2013). While the findings of the study highlight the ability of habitus and capital to evolve, at the same time the reproductive nature of habitus and capital may be challenging to escape. Accordingly, school fields, where students are ostensibly provided equal opportunities, may have a role to play in developing students' habitus and capital.

School field

It is important to note that there was a level of interaction between school and everyday life fields. The habitus and capital associated with everyday life fields are not separate to the school field. As Bourdieu outlined,

> the habitus acquired in the family underlies the structuring of school experiences…and the habitus transformed by schooling, itself diversified, in turn underlies the structuring of all subsequent experiences…and so on, from restructuring to restructuring. (Bourdieu, 1977, p. 87)

Thus, the fields students occupy are connected through the structuring and restructuring of habitus and capital. Accordingly, the habitus of the individual and the school field is an important consideration in understanding students' practices, as the alignment of an individuals' personal habitus with that of the field determines success in that field (Swartz, 1997).

As evidenced throughout the findings, students' habitus varied. Students had varying dispositions or preferences toward technology practices for learning. Therefore, as shown in Chapters Seven and Eight, students' engagement with technology practices for learning at school was not uniform. Some students' disposition toward technology use aligned with the expected practices in the school field, while others' was disparate. These findings correspond to research findings outlining the influence of students' diverse backgrounds on their skills, knowledge and outcomes at school (Hatlevik & Christophersen, 2013; OECD, 2009; Smith, et al., 2013). More specifically, factors such as higher socio-economic status, parental occupation and employment and enjoyment of reading positively related to students' digital literacy. However, few studies have explored the influence of students' perceptions and beliefs about education and the use

of technology, and the associated influence on their technology practices (Heemskerk, et al., 2012; Kolikant, 2010; Lahtinen, 2010; Li, 2009).

Not only did students' habitus vary, so too did their capital. While students acquired varying capital in their everyday life fields, through social and online networks of contacts, support and time invested in using technologies, these practices were mostly distinct from those conducted in the school field (Chapters Five and Six). Capital that students develop in their everyday lives has varying levels of currency in the school field, as capital is only of value when recognised by the field (Bourdieu, 1986a). For example, in this study, teachers reported technology practices for learning required students to use word processing, PowerPoint presentations, critical and evaluation skills when conducting internet research, troubleshooting, as well as organisation and storage skills. However, teachers reported that they felt that many students lacked the capital to engage in these technology practices (Chapter Six). Moreover, few students engaged in these practices in their everyday lives. These findings correspond to research that suggests that students' technology competencies are varied, particularly those relating to their schools' technology practices (Calvani, et al., 2012; Hatlevik & Christophersen, 2013).

Consideration of cultural capital is of particular significance in the school field, as it is an intellectually grounded field. Therefore, cultural capital is the dominant currency of the field (Grenfell, 2009). Findings presented in Chapters Seven and Eight demonstrated how students' varied cultural capital had a reinforcing or reproductive effect, where students who eagerly engaged in technology practices for learning were those who possessed the necessary cultural capital for the school field. Additionally, the findings suggested that teachers' capital also shaped students' uses of technology. The study findings also demonstrated that teachers felt they lacked the cultural capital – more specifically, pedagogical knowledge and training to develop skills and knowledge about technologies – to confidently integrate technology uses that met students' learning needs and preferences (Chapter Six). This corroborates previous research, suggesting that teachers' knowledge and skills with technology is a critical factor in determining technology integration (Ertmer, et al., 2012; Tondeur, Kershaw, Vanderlinde, & van Braak, 2013).

Despite little evidence that technology skills and knowledge were being taught, a smaller number of students acquired capital in the school field. Students recounted some foundational technology experiences at primary school that exposed them to new technologies and practices that they had not experienced in their everyday life fields (Chapter Eight). However, only one student case, Alice, described learning new technology skills and knowledge at high school. Therefore, the evidence suggests that opportunities to develop or acquire capital in secondary education were rare. This supports previous research suggesting that schools inadequately address students' varied digital skills, thus perpetuating digital skills inequalities (Samuelsson, 2012).

9.3.3 Summary

In summary, the research findings of this study demonstrated that students' habitus and capital were shaped by circumstances and experiences in their everyday lives and at school. Thus, an understanding of students' formative experiences in everyday life are critical to understanding students' practices with technology at school, and, ultimately, better informing teaching and learning. Understanding students' technology practices in this way reveals that technology practices are not a product of any one factor. Instead, students' technology practices are shaped by a multitude of interrelated structures, specifically through the school and everyday life fields, habitus and capital. Thus, the study findings demonstrated the social nature of technology practices, in that the practices are inextricably linked to the milieu in which they occur.

This means that students enter the school field with varied preferences for technology use for learning, dispositions towards technology use (habitus) and skills, knowledge and supports (capital). However, the findings of the study also depicted school technology practices as being prescriptive, with minimal options for student autonomy or opportunities for learning about technologies. Consequently, these findings suggest that technology practices for learning that overlook students' varied experiences, skills and knowledge may limit students' engagement and learning with technology at school. Thus, it is inferred that a one-size-fits all approach to teaching and learning with technologies may be inadequate in catering to students' varied learning needs with technologies.

While Bourdieu's theory of practice appears to depict students' practices as reflexive based on their habitus and capital, the theoretical constructs offer transformative potential to addressing student inequalities in education (Mills, 2008). The implementation of the one-to-one laptop initiative, present in the two Australian secondary schools in this study, addressed inequalities in students' economic capital (New South Wales Department of Education and Communities [NSW DEC], 2012). Additionally, school fields have the potential to create experiences that broaden and shape students' experiences with technology (habitus) and provide opportunities to build their skills and knowledge and their support networks (social and cultural capital). The findings suggest that teachers' integration of technology in learning experiences may benefit from a different approach that positively contributes toward shaping students' habitus and building capital. One example of this may be exposing students to a variety of technologies and technology applications, such as creating a movie or website, that students may not experience in other fields.

The application of Bourdieu's sociology in this study is a contribution to the field of educational technology research. The study used Bourdieu's theory of practice to theorise students' technology practices, thus making two contributions. First, the findings of this study contributed to the application of Bourdieu's theory of practice to technology specific practices, an area largely absent in Bourdieu's writing and research (Sterne, 2003). Second, the use of Bourdieu's theory contributed a deeper understanding of the underlying logic of secondary students' technology practices.

9.4 Research Question 3: Why do students use technologies?

Despite extensive research in the area of educational technology, very little is known about the underlying logic of students' technology use (Chapter 2). Using a sociological lens, this research aimed to explore the influencing factors and reasons behind students' technology practices. To do this, the 12 student case studies provided opportunities to explore in depth the underlying logic of students' technology practices. Case study findings, particularly those presented in Chapter Seven, demonstrated that students used technologies that they valued. In other words, students deemed the technology as being important or useful.

The findings of this study demonstrated that students engaged in technological practices that they deemed to be possible and probable, and that they perceived as profitable in some capacity. Though the reasons behind students' technology practices were varied and determined by the field conditions, as discussed in the two previous research questions. This means that what each student deemed to be possible or profitable was personalised based on their habitus and capital and the field in which the practices were conducted.

9.4.1 Students engaged in technology practices perceived as possible and probable

The analysis of the study findings demonstrated that students' reasons for using technologies might be determined by their habitus. Habitus is an internal "schemata of perception, appreciation, and action" (Bourdieu & Wacquant, 1992, p. 16) or way in which an individual sees the world. Therefore, an individuals' habitus determines whether they perceive a practice as possible or impossible, probable or unlikely. Their success or failure, which may be actual or perceived, is "internalized and then transformed into individual aspirations and expectations" (Swartz, 1997, p. 103). As outlined in the previous research question, students' experiences and circumstances in the home field were foundational in shaping their habitus and capital. In turn, these were internalised, shaping the way the student perceived the world.

It can therefore be inferred that teachers and students in the study engaged in technology practices at school that were perceived as possible and probable. In other words, they were familiar with the technologies and/or had a likely chance of achieving the desired outcome when using the technology. Specifically, in the school field teachers and students most commonly engaged in online research and using word processing applications to write or make notes (Chapter Six). This suggests that teachers and students engaged in these practices frequently in lessons, as they were familiar practices that were likely to achieve success or desired outcome. For example, Lawson believed the purpose of the school-issued laptops was to conduct these tasks; and he was positive in his disposition toward the tasks (Chapter Seven). However, in a small number of examples, students expressed a preference not to use technologies. For example, Alice

preferred to write her notes in her book (Chapter Eight). It is inferred that her limited experiences with technology at home structured Alice's habitus. Specifically, the shared access to the family's technology resources meant more limited exposure to technologies (socialisation) and consequently a misalignment of capital and habitus and thus influenced her perception that the use of technology was not familiar or, more likely, did not result in success for her.

The underlying logic of students' technology practices was particularly evident in everyday life fields, including students' homes. The findings of the study demonstrated that unlike the school field, most students had relative autonomy in their technology practices in the home (Chapters Seven and Eight). But despite this freedom, student practices centred on those perceived as possible or familiar to them. This was demonstrated in Chapter Eight, where students' technology practices were likely to reflect those in their networks, including family and friends. Moreover, descriptions of students' early technology experiences were sustained and continued to shape their current perceptions and practices with technologies (Chapter Eight). This finding contributes to emergent evidence of parents' habitus informing what technology practices are determined as probable and profitable for them and their children (Hollingworth, et al., 2011). This is evidence of the self-propelling and enduring nature of habitus. Additionally, it demonstrates the importance of early foundational experiences of social and cultural capital in socialising individuals into techno-culture.

Family perceptions, beliefs and practices, as well as field conditions and structures, shape the way students view the world; that is, what is possible and probable. The findings of this study correspond with research into students' future and occupational aspirations (Archer et al., 2012; DeWitt et al., 2011). The findings of these studies highlighted the link between students' aspirations and their circumstances, demonstrating that aspirations "arise from the young person's direct context and inevitably reflect social context extremely strongly" (St Clair & Benjamin, 2011, p. 514). More specifically, a study of primary school students' aspirations for education evidenced that family habitus and capital provided a "fertile ground" for students to capitalise on nascent interests and perceive some practices and aspirations as more probable or desirable (Archer, et al., 2012, p. 890). These findings suggest that some students' circumstances and experiences equip them with an understanding of "the game"

at school (Chapters Six and Seven) (Bourdieu, 1990b, p. 82). While other students, whose circumstances may underprepare them to grasp the rules of the game, are more likely to perceive their involvement as improbable, and thus symbolically remove themselves from playing the game (Taylor, 2005).

9.4.2 Students engaged in technology practices perceived as profitable

Students were likely to engage in technology practices that they perceived as profitable. Throughout this study, findings have demonstrated that students' practices were based on their individual habitus and the field conditions in which they were immersed. Part of an individual's habitus, and a driver of practice, is *interest*. According to Bourdieu, all practices are interested, in that they are profitable to the individual in some way, either materialistically or symbolically (Bourdieu, 1990b). The profit gained from engaging in certain practices may serve "to define and improve their position" in the field (Grenfell, 2012, p. 152). These motivating interests and profits function at a "tacit, prereflective level of awareness that occurs through time" (Swartz, 1997, p. 67).

Students engaged in technology practices in which they likely had some interest and perceived as symbolically profitable. Some students perceived that the use of technology for educational purposes improved their learning (Chapter Six). Thus, improved learning outcomes, whether perceived or actual, profit the student symbolically. Students in the study had an invested interest in the use of mobile technologies, including their school-issued laptops. When asked what technology they could not live without, half the student cases indicated mobile devices, including laptops, mobile phones and iPod Touch devices (Chapter Seven). Students had an invested interest in these devices. They perceived them as a connection to friends, family and a world of information, enabling them to perform a range of practices in any field (Chapters Five and Six). Students also invested large amounts of time using these devices, consequently developing technology based skills and knowledge. Specifically, students developed skills and knowledge through creating and maintaining social networks through the use of social networking sites, email and other forms of communications, and developing skills and knowledge required for gaming and internet browsing (Chapters Five, Seven and Eight). The time invested in these practices may

provide students with cultural and social capital through technological skills and knowledge and relationships formed, thus being symbolically profitable. While in the school field, the teachers attempted to use students' cultural capital through the use of learning management systems, including Edmodo and Moodle, to mirror social networking tools. However, the study findings and other recent research indicate minimal uptake of learning management systems by students and minimal impact on learning (Chapter Seven) (Hew, 2011; Mao, 2014). This suggests that students may not profit from or perceive the worth of such technologies in the school field.

Students' interest in technological devices, such as their school-issued laptop, was shaped by their circumstances. The findings demonstrated that some students valued their school-issued laptop more highly than others. Generally, students who valued their school-issued laptop had access to fewer technology devices in the home. Conversely, those students who had access to a greater variety of technologies in the home used their school laptops only at school and highlighted the limitations of the device (Chapter Seven). This suggests that students who had access to technologies with greater capabilities than the school-issued laptops may have perceived other technologies as more profitable, while those students who had access to fewer technologies may have profited from the use of their school-issued laptop.

Findings from the class and student cases outlined students' valued constant and instantaneous access to information online. Ten of the 12 student cases described the internet as an invaluable source of information (Chapter Seven). Students described how access to the internet provided them with connection to vast amounts of information, perspectives and modes of learning; moreover, their access was something they valued highly for a range of purposes. The potential symbolic profits suggest that this use of technology was *interested* or of value to them. Connectivity provides the potential for individuals to capitalise on or symbolically profit from the "opportunities that connectedness offers" (OECD, 2012, p. 15). With this in mind, connectivity may be viewed as a form of cultural capital acquired through practice and training, and as a form of social capital, as individuals may profit on a social level through networks of contacts and supports.

Students also valued technologies for their capacity to perform practices with efficiency. Two-thirds of student cases described using word processing software as an efficient practice (Chapter Seven). Some students valued this use of technology, as it allowed them to complete their work quickly and efficiently, while other students preferred to use pen and paper to record notes, as they felt it improved their studying practices and thus was deemed as profitable (Chapters Six and Seven). These findings contribute to contemporary understanding of students' technology practices by highlighting the role of students' interest in shaping their technology practices. This is a fresh approach to exploring the influencing factors on students' technology practices. There is a tendency in educational technology research to presume the profit to be gained through use of technology. For example, the use of interactive whiteboards in class will ostensibly let students interact with the lesson content. Overlooking the perspective of the student and their interest in the technology use is a missed opportunity to understand how and why students use technologies.

The findings of the study also evidenced that technology practices in the school field seemed to presume the profit to be gained by students. In the school field, students' valuing of and perceived profit from technology practices was neither considered by nor reflected in their technology practices. Teachers in this study described the place of technology in education as preparing students for the employment and life in a digital society. While this sentiment resonates with the national curriculum, it was not reflected in students' interest in technology (ACARA, 2013b; 2013c). Instead, students were interested in technologies as they provided access to information and efficiency in their practices. Through a Bourdieuian analysis, students' interest in technologies is of no surprise, as individuals may not be capable of aspirations beyond their habitus. This has implications for those students who may not be *interested* in education and technology. Teachers, schools and families may have a role to play in providing opportunities for students to broaden their experiences with technology and capitalise on nascent interests. Broadening students' experiences with technologies may expose students to new technologies and applications and, in turn, broaden their awareness of the profits that may be gained through the use of technologies.

9.4.3 Summary

In summary, this study evidenced that students engaged in technology practices that they saw as possible, probable and profitable. Structured by their habitus, students were inclined to use technologies with which they had some familiarity or to which they had some exposure, based on their experiences and the likelihood of achieving the desired outcome. Students' habitus and capital also determined whether they perceived particular technology practices as profitable. The technologies that students valued were those that were profitable and thus those in which students had an invested *interest*.

Theoretical analysis of the study findings demonstrated the underlying logic of students' technology practices; specifically, understanding why students engage in particular technology practices. This understanding has the potential to inform teaching practice, not only through the integration of technologies valued by students, but through more effective integration of technologies that may be less familiar to students.

9.5 Practical implications

Throughout the course of the research, and particularly in analysing and reporting of the findings, awareness was returned the researcher's biases, as outlined in Chapter Four. This was particularly so when considering the practical implications of the findings, given the researcher's experience as teacher.

Proposing practical implications for teaching and learning may be ostensibly at odds with Bourdieu's sociology. Bourdieu theorised schools as a field whose purpose was to socialise students by preparing them for working society (Swartz, 1997). Moreover, emphasising "that schools teach students *particular* things and socialize them in *particular* ways" (Grenfell, 2009, p.188). These particular ways are the habitus and capital of the dominant culture. The act of teaching places value in particular knowledge and practices. Thus, all pedagogic action is a form of domination and symbolic violence (Bourdieu, 1990).

Generally, sociology does not prescribe specific action, but Bourdieu's theory does "encourage becoming aware of the arbitrary nature of symbolic domination" (Grenfell, 2009, p.196). It is with this orientation that the practical implications from the research

are carefully considered. In following this tradition the study strove for understanding, highlighting the underlying logic of practice. Thus, the practical implications outlined from this study foster an awareness of the underlying logic of practice, with some considerations to encourage more equally beneficial learning opportunities.

9.5.1 Considering students' learning contexts

> Bourdieu argued that in order to understand interactions between people, or to explain an event or social phenomenon, it was insufficient to look at what was said, or what happened. It was necessary to examine the social space in which interactions, transactions and events occurred. (Thomson, 2008, p.67)

Through in-depth investigation of students' technology practices, specifically through discussion of their practices and consideration of a range of contextual factors, the study demonstrated that technology practices were not a result of any one factor. In fact, student technology practices were a result of an intricate network of personal, cultural and social experiences and circumstances that structured students' habitus and shaped their practices according to field. The findings of this study highlighted the diversity of students' backgrounds, experiences and circumstances and their influence in structuring and shaping students' technology practices in all fields. Through a sociological approach the study conceptualised the social spaces in which technology practices occurred, and by doing so depicted students' school and everyday life fields as being distinct.

Thus, consideration of everyday life and school contexts may be an informative tool in understanding students' technology practices. Understanding practice *and* context has the potential to inform teaching and learning with technologies. An understanding of students' technology practices in their everyday life fields may inform understanding of how students perceive, approach and engage with technology practices in the school field. Additionally, considering the structure and mechanisms of the school field may show alignment or disparity between fields and the alignment of students' habitus and capital with those of the school field. On the most practical level, an understanding of contexts illuminates factors that limit students' technology practices, like limited capital; and positive influencing factors, such as teachers as agents of socialisation, shaping students' social and cultural capital and habitus.

9.5.2 Understanding the purposes of technology practices

The study explored the underlying logic and reasons behind students' technology practices. Such findings suggested that students engaged in practices in which they had an invested interest. Ultimately, an understanding of the purposes for which students engage with technologies has the potential to inform teaching and learning. More specifically, an understanding of the purposes for which teachers and students use particular technologies may assist teachers design lessons with a clear purpose that is shared with and has relevance to students. Upon reflection on these findings, it would have been worthwhile to also study the reasons for teachers' technology practices for teaching and learning beyond their perceptions of the role of technology in education. As Bourdieu states that all practices are interested, comparisons of teachers and students' interests may have been informative (Bourdieu, 1990b). Nevertheless, in theorising all practices as being interested, teachers may consider their own interest for using technology in their teaching and their own perceptions of the intended profits to be gained by students to inform their teaching with technologies. Reflections of interests may inform teachers' technology practices for teaching and learning to better reflect their perceptions of the role of technology in education. Students and teachers' interest for using technology is of increasing significance as learning with and about technologies becomes increasingly prominent in curriculums worldwide (ACARA, 2013b).

9.5.3 The transformative potential of teachers and schools

In understanding the underlying logic of students' technology practices and examining the school field, attention is drawn to variation in students' habitus and capital and their alignment with those of the school field. The habitus and capital of some students were aligned with, and thus legitimised by, the school field, while other students' habitus and capital have less or no currency in the school field. Thus, a pedagogy that makes fewer assumptions about students' dispositions, skills and knowledge of technologies may provide opportunities for learning that cater to students' personalised learning needs.

As conceptualised throughout the thesis, schools are a site for socialisation, teaching particular skills and knowledge in particular ways of the dominant culture (Grenfell, 2009). However, the findings suggest that the school fields did not socialise students

through exposure to a broad range of technology practices. Learning experiences that build students' cultural and social capital, socialise them in technology use and expose them to skills, knowledge and a techno-culture that is different from practices in their everyday lives. This may in turn shape their habitus, ultimately with the potential to expand their horizons and prepare them for digital futures. This may be achieved through more flexible learning environments that allow classrooms to be a field of teacher-to-student and student-to-student socialisation, providing opportunities for students to perform a range of technology practices but also allowing opportunities for personalisation of learning according to their dispositions. Indeed, part of this awareness of students' varied technology practices may involves avoiding a one-size-fits all approach to learning about and with technologies and may include options for explicit teaching of some technological skills and knowledge.

As technology becomes increasingly ubiquitous in society and education the consideration of schools as a site for socialisation is of increasing significance. Since the commencement of this study, technology has continued to become more prominent in the Australian curriculum outlining digital skills and knowledge such as computational, systems and design thinking as necessary for students' success in society and national prosperity (BOSTES, 2016). Through a Bourdieuian perspective, these are the skills and knowledge of the dominant culture and thus teaching the curriculum, an act of symbolic violence. Practically though, this is not to say that schools should not have a role to play in preparing students for their digital futures. Rather, the findings of this study demonstrate that teaching with and about technologies needs to consider students' varied backgrounds, experiences, circumstances and dispositions with technology.

9.6 Contribution to research and theory

The findings of this study advance understanding of secondary students' practices with technology. This was achieved through qualitative empirical data, albeit of a small sample of students, but using rigorous and context specific data collection methods (as outlined in Chapters Three and Four). Through in-depth case studies using a sociological approach the study demonstrated the personal and varied nature of technology practices. Furthermore, the study evidence challenges popular assumptions

about generational characteristics of students and their technology use. There is a growing body of research that challenges these claims about higher education students (Corrin, et al., 2013; Kennedy, et al., 2010; Margaryan, et al., 2011). However, this study makes a contribution to understanding of younger students, for which the evidence is scant (Calvani, et al., 2012; Sánchez, et al., 2011; Smith, et al., 2013). Specifically, the study advances understanding of the varied characteristics of secondary students' technology practices.

The study advances understanding of student technology use as a social practice. Students' technology use was structured by and connected to the field in which it occurred. Through consideration of the contexts in which students engaged with technologies, the study highlighted the social nature of technology practices through demonstration of the interrelations between individuals and physical and social structures. Understanding the contexts of practice in this way also highlighted examples of field conditions that limited or facilitated students' technology practices through empirical examples of the reproductive nature and transformative potential of teaching and learning with technologies. Studies such as this offer a valuable insight into the nuances of students' technology practices, and add depth to understanding provided by larger scale studies.

The ability of the study to highlight the personal and social nature of technology practices was achieved through the theoretical framing. This is a contribution in the field educational technology research given that the review of current literature demonstrated the need for theoretically framed research in the field of educational technology to pursue questions that require sociological perspectives (Chapters Two and Three). Therefore, this study addressed this deficit in educational technology research and demonstrated the utility of such an approach. Application of Bourdieu's theory of practice provided a means through which to view and understand student technology practices in a multifaceted manner. While a small number of researchers have employed the theory of practice to investigate secondary students' technology practices, these studies were focused on either specific groups of students (Johnson, 2007; Robinson, 2009; Sutherland-Smith, et al., 2003) or a specific field (Bulfin & North, 2007), or adopted only particular aspects of Bourdieu's theory (Hatlevik & Christophersen, 2013; Tondeur, et al., 2010). This study therefore makes a contribution

to the field of educational technology research through application of all theoretical constructs of the theory of practice to investigate students from varied backgrounds (within the scope of the sample) and across various fields (Bourdieu, 1990). It is acknowledged that Bourdieu is just one example of sociological theory that may be employed to advance understanding. Though, the application of his theoretical constructs offers an operational method to investigate technology practices across students' lives and explore technology practices through the interrelations between physical, individual and social structures.

Additionally, the study conceptualised technology specific practices through Bourdieu's theoretical constructs. These technological manifestations of Bourdieu's theoretical constructs were developed based on the findings of the study and review of the literature (Table 4 in Chapter Three). Specifically, the study demonstrated that both objectified and embodied aspects of field were influential in shaping students' technology practices. While the investigation of objectified field structures such as access to technological resources have been shown to be influential (Barron, et al., 2010; Eynon & Malmberg, 2011; Khan, et al., 2014; Kuhlemeier & Hemker, 2007; Robinson, 2014a; Smith, et al., 2013), subtler objectified aspects such as the quality, location and distribution of these resources also shape technology practices. In this study, even subtler were the embodied aspects of the field, which were evidenced to shape technology practices. These included the individuals' position in the field and the culture of technology use, including rules that govern practices and the individuals' understanding of the rules. Capital, specifically cultural and social capital, was demonstrated in the study, providing empirical evidence for forms of technological capital (Selwyn, 2004). The findings showed how the time students invested in participating in and developing technological skills and knowledge and the networks of technological support and contacts developed their capital. These systems and structures are internalised as habitus. More specifically, the study demonstrated how individuals' circumstances in a particular field, past and present experiences and the doxa of a field are embodied, thus determining individuals' ways of being and how they perceive the world. Notoriously difficult to research, habitus in this study was explored through investigation of students' backgrounds, experiences, perceptions and beliefs and other field participants (Table 4 in Chapter Three). Thus, the application of Bourdieu's theory

in relation to technology specific practices provides a foundation for further research to investigate students' technology practices.

9.6.1 Research limitations

The findings of this study must be considered in light of the research limitations. Several limitations arose due to the exploratory nature of the research questions and the complexity of the object of study, which was students' technology practices across multiple contexts in students' everyday lives and school. The data collection methods used in the study were designed to collect data from these contexts through the students' perspectives; however, several limitations became evident in their application. The questions in the questionnaires and the initial student interview did not prompt students to respond to how they used technologies in particular everyday life contexts, such as family and friends' homes, community spaces or work. Therefore, the data collected pertaining to these particular everyday life contexts relied on students offering this information without being prompted. However, the data collection methods in Phase 2 were more effective in generating details of context. In Phase 2, the technology diary records and subsequent discussion in the final student interview prompted students to discuss the multiple particular contexts of their technology use. Other data collection methods, such as observation or specific additional questions, could be included in future research to collect data across various contexts of students' lives.

There are inherent limitations with self-reports in data collection methods. In this study, the questionnaire, technology diary and interview data generated a subjective and likely incomplete report of students' and teachers' technology practices. The limitations associated with the self-reported data were carefully considered in the design of the methodology, with the decision that the rich subjective data gained through listening to the participants' perspectives balanced the challenges. Multiple overlapping data sources served to overcome inconsistencies or omissions in the data (Stake, 2006; Yin, 2009). Moreover, exploratory research of this kind makes a contribution to empirical research through highlighting important subtleties in students' technology practices that may not have been revealed with other methods. To address this limitation of self-reported data, students' subjective accounts could have been balanced with direct observations or tracking of their technology practices.

There were also limitations in the scope of the research methodology, particularly in the time frame and sample size. The data collection time frame was limited to data collection within one school term (10 weeks) and diary records of students' technology over two weeks. This time frame was chosen for practical reasons associated with the doctoral research timeframe and considerations of the burden of data collection on the participants. However, engagement in students' everyday life and the school context over an extended period of time would likely provide a more comprehensive account of the range and patterns of technology use in these contexts. Additionally, the relatively small sample size of four Year 9 and 10 class cases, comprising 64 students and their teachers, limits the generalisability of the findings. It is acknowledged that the small sample was not large enough to be representative of all students and teachers' technology practices. As the study involved four teachers and their students from one of their classes, the findings do not demonstrate students' technology practices across all classes and subjects they engage with. The study was not representative of teachers across a broader range of subject areas, which has also been demonstrated to shape technology practices in class (Howard, Chan & Caputi, 2015). The sample of this study relied on teachers who had some interest in technology, either seeking to improve or having a particular interest in the use of technology at school. This means that the study does not account for teachers who prefer not to use technologies or teachers who are heavy users of technology. The sample of students from one regional city was not representative of all students. Further research may involve students from other areas (remote, rural and city locations), young people of various ages (across all years of secondary school), students from different secondary schools (public and independent) and students from more diverse backgrounds (higher and lower socio-economic backgrounds) to provide a more comprehensive and representative account of students' practices.

To ensure the credibility of the research, effort was made to provide rich descriptions of context for the geographical area of the cases, the schools and participants involved in the study. It is anticipated that through this contextual detail, generalisations may be made at the reader's discretion. It is also important to note that the small sample size was purposively designed to ensure the feasibility of the multiple in-depth data collection methods. At the same time, the findings from the multiple embedded cases

are an important contribution to an understanding of students in one Australian context. Together with future research on students in other contexts, particularly from other countries' education systems with similar or contrasting educational technology initiatives and curricula, may create a rich tapestry of understanding. Furthermore, this understanding may also inform the introduction of technology initiatives in other countries or the introduction of new technologies in schools.

Theoretically, the study acknowledged the influence of other field participants on students' technology practices. Thus, the study collected data on teachers' technology practices. However, the interview methods were insufficient to produce a comprehensive understanding of teachers' use and perceptions of technology for learning. Furthermore, collecting data from other field participants, including school leaders as well as students' family and friends, would provide a more holistic understanding of students' school and everyday life fields and further detail about how these individuals' practices may shape students' technology practices.

The study proposed the utility of a sociological approach to understand students' technology practices. While this study adopted Bourdieu's theory of practice, it is acknowledged that this is just one way to conceptualise technology practices. Limitations may also be associated with the criticisms of Bourdieu's theory, specifically his deterministic approach, ambiguous and inaccessible language and limited relevance to practical implications (Jenkins, 1992; Nash, 1990). It is acknowledged that other theories that conceptualise technology practices as complex, relational and social, such as activity theory or the social construction of technology, may be applied to the study of students' technology practices (Oliver, 2011; Selwyn, 2012).

9.6.2 Recommendations for future research

This study adds to the research into secondary school students' technology practices within context. The study demonstrated the complex and social nature of technology practices, yet also highlighted many aspects of students' technology practices that require further research. More specifically, exploration through Bourdieu's theory of practice of students' technology practices highlighted a number of individual and social influences in students' everyday life and school contexts that require further investigation.

The findings of the study demonstrated how a range of physical, social and individual factors with students' everyday life contexts shaped students' technology practices. However, data collection methods that observe students' and others' technology practices or ask more specific questions about the contexts of technology use, particularly students' homes, would provide a more comprehensive understanding of how students' everyday life fields shape their technology practices. Furthermore, there is certainly scope for future research to investigate students from more diverse backgrounds. Exploring the variations in students' backgrounds, including students from a broader range of socio-economic backgrounds, parental occupations and family structures, may highlight systems and structures that facilitate the development of students' habitus and capital that assists young people engage with technologies at school and across their lives.

A closer examination of the school field would also provide further insights into how these systems and structures shape students' technology practices. Many aspects of school and schooling are taken for granted and may benefit from critical analysis (Bourdieu & Passeron, 1990; Selwyn, 2012). The limitations of this study highlighted that to holistically understand the school field of technology practices, other field participants, including school leaders as well as teachers and students, and field structures such as school rules and policies are required. While this study investigated teachers' practices and perspectives, the findings raised further questions about details of teachers' practices. Future research may explore teachers' technology practices, skills and knowledge with technologies in their everyday lives as well as at school to provide an understanding of the underlying logic behind teachers' use of technology at school.

Future research may also adopt observation methods to add depth to teachers' perspectives and provide more detailed accounts of how technologies are used at school.

The findings of this study concluded that schools were significant in shaping students' technology practices, and thus that there was potential for schools and teachers to transform students' habitus and capital to facilitate their learning. This gives rise to a need for future research that will detail examples of transformative technology practices in schools, which would provide evidence and detail about particular physical, individual and social structures that facilitate such transformative practice.

Additional to further investigation of the everyday life and school fields, future research may also explore the interrelations between these fields of technology practice. Much research focuses on the influence of students' backgrounds on their technology practices at school; however, the findings of this study also suggested that the school field shapes students' technology practices in their everyday lives. The study outlined that schools have a role to play in providing students with equal opportunities to learn at school and to prepare students to successfully participate in an increasingly digital society and their working futures. Future research may investigate the outcomes of students' technology practices at school, further study and work. One example of this kind of research could be a longitudinal study that investigates students' technology practices throughout their schooling and how this shapes their life trajectory and preparedness to use technologies in further studies or work.

Finally, while this study focused on secondary school students' practices, there is undoubtedly scope for more studies that explore the sociology of educational technology (Bennett & Maton, 2010; Oliver, 2013; Selwyn, 2012). It is recommended that the field of educational technology research would benefit from more studies that adopt a sociological framing. Studies that disregard the broader influencing factors of technology practices may lack the ability to deeply understand practice, and this may reduce their potential to effectively inform future educational practice.

9.7 Conclusion

The research presented in this thesis addressed a significant gap in contemporary understanding of the social and complex nature of students' technology practices. In order to effectively use technologies in secondary schools to benefit students' learning and future opportunities, there is a pressing need for evidence-based practice. Despite significant government investments worldwide, increased prominence in educational curriculums and research efforts, there is a lack of conclusive evidence about the details of students' technology practices, and why they use technologies in particular contexts. The outcomes of this study provided a more comprehensive understanding of the technology practices of a small sample of students, suggesting that secondary students' technology practices are shaped by a multitude of contextual and personal influences.

The key findings of the study can be summarised as follows:

- Students' technology practices were innately social, as they were inextricably linked to and shaped by the field in which they occur.
- Students' technology practices were varied based on the students' personal interests, purpose of technology use and dispositions.
- Students regularly used technologies in a routine manner and often used only rudimentary functions of the technology. The study thus provides empirical evidence that challenges common assumptions about this generation of learners.
- Students had varied dispositions towards the use of technology for learning. This was despite students' technology practices at school being generally teacher directed with minimal opportunities for student agency. This suggests that students respond differently to learning experiences involving technologies, and that there is no one best way to use technologies in schools.
- Students' varied experiences and dispositions towards technology practices for learning were structured by a multitude of factors, including context, their experiences and dispositions, skills and knowledge, others' technology practices and perspectives.
- Students were most likely to engage in technology practices that they deemed as familiar and likely to achieve success and were symbolically or materially profitable.

The outcomes of this study advance understanding of the complex and social nature of secondary students' technology practices. This was achieved through theorising technology practices using Bourdieu's theoretical constructs, thus contributing to the theory and empirical understanding of students' technology practices, and so providing a conceptual framework of technology practice that may inform future research.

The study conclusions contribute empirical evidence to a growing body of research that asserts that students' technology practices are more complex than current conceptions suggest. Rather, the findings of this study demonstrate the social and personal aspects of students' technology practices. This is a significant contribution, as variations in students' technology practices indicate inequity in their capability to engage with technologies and learning at school, potentially affecting their achievements at school and in their everyday lives. The study findings inform technology integration approaches in secondary schools, the implementation of current ICT curriculum outcomes and inform the role of secondary schools in developing students' technology skills and knowledge at the curriculum and policy level. However, the deficit of research of this kind means that there is still much to learn about students' technology practices in everyday life and at school.

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APPENDICES

Appendix A: Statement of contribution of others

Six of the chapters presented in this thesis are in-preparation or published journal articles. The author contribution is outlined as follows and further detailed in the Thesis Structure in Chapter 1.

- Chapter 2: **Beckman, K**., Bennett, S. & Lockyer. L. 'Secondary school students' technology practices across their lives: A systematic literature review' prepared for publication in *Educational Research Review*
  Author contribution: Karley Beckman (90%); Sue Bennett (5%); Lori Lockyer (5%)
- Chapter 3: **Beckman, K**., Bennett, S. & Lockyer, L. 'Conceptualising educational technology in schools through a Bourdieuian sociology' prepared for publication in *Learning, Media and Technology*
  Author contribution: Karley Beckman (90%); Sue Bennett (5%); Lori Lockyer (5%)
- Chapter 5: **Beckman, K.,** Bennett, S. & Lockyer, L. 'Title' prepared for publication in *Australian Journal of Education*
  Author contribution: Karley Beckman (90%); Sue Bennett (5%); Lori Lockyer (5%)
- Chapter 6: **Beckman, K.,** Bennett, S. & Lockyer, L. 'Examining the school field of technology practices' prepared for publication in *Computers & Education*
  Author contribution: Karley Beckman (90%); Sue Bennett (5%); Lori Lockyer (5%)
- Chapter 7: **Beckman, K**., Bennett, S. & Lockyer, L. 'Understanding students' use and value of technology for learning.' *Learning Media and Technology, 39*(3), 346-367.
  Author contribution: Karley Beckman (90%); Sue Bennett (5%); Lori Lockyer (5%)
- Chapter 8: **Beckman, K.**, Bennett, S. & Lockyer, L. 'Exploring the transformative potential of young peoples' technology practices in schools' prepared for publication in *British Journal of Educational Technology*
  Author contribution: Karley Beckman (90%); Sue Bennett (5%); Lori Lockyer (5%)

The primary contribution in each of the in-preparation or published journal articles has been undertaken by the PhD candidate, Karley Beckman, and the contribution of co-authors, Professor Sue Bennett and Professor Lori Lockyer, was primarily through the provision of feedback and review.

K Beckman.

Karley Beckman
PhD candidate

Professor Sue Bennett
Research supervisor

Professor Lori Lockyer
Research supervisor

Doctor Sarah O'Shea
Head of Postgraduate Studies

Appendix B: Copyright clearance for Chapter 7

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Appendix C: Conference paper

Beckman, K., Bennett, S., & Lockyer, L. (2014, June). Reconceptualizing technology as a social tool: a secondary school student case study. In *World Conference on Educational Multimedia, Hypermedia and Telecommunications* (Vol. 2014, No. 1, pp. 1554-1559).

Reconceptualizing technology as a social tool: A secondary school student case study

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Abstract: This paper asserts that technology is an innately social tool and that the field of educational technology can benefit from research with a sociological framing. The study reported on in this paper adopts Bourdieu's sociological concepts to conceptualize and understand students' technology practices. This paper reports in detail on one case from the multiple embedded case study, which aimed to investigate the broader milieu of students' technology practices. The findings from this case demonstrate how the student's technology practices were inextricably linked to the social contexts in which they occurred and how these social contexts shaped the student's perceptions and beliefs about technology.

Introduction

Recent criticisms describe educational technology research as overly deterministic. Specifically, it has been suggested that research in educational technology focuses on the affordances of technologies and the effects on teaching and learning often without acknowledging the broader aspects of education and society (Oliver, 2011; Selwyn, 2012). Many studies in the field of educational technology have taken a cause-and-effect position to investigate the practicalities of technology integration in schools. Selwyn (2012) asserts that these studies are often reductive in their analysis, simplifying the messy reality of technology practices. Despite offering immediate practical benefits to those associated with such inquiries, they offer little to advance the broader understanding of technology use in education (Bennett & Oliver, 2011). Research in the field of educational technology would benefit from a sociological framing that pays attention to the understandings and life worlds of learners and technology practices within these contexts (Erstad, 2012; Selwyn, 2012).

This paper argues that technologies are inherently social. The users and their contexts shape an individual's practices with technology. Thus, we propose in order to adequately understand an individual's practices with technology, the structures, cultures, practices, and relations that constitute technology use in a particular context must simultaneously be considered.

Sociological theories have been used to explore the complexities of practice with consideration to the milieu in which it occurs. However, despite application in science and technology disciplines, sociological studies are relatively rare in the field of educational technology (Oliver, 2013; Selwyn, 2012). Bourdieu's sociological concepts are one example of theory that can be applied in educational technology research (Johnson, 2009; North, Snyder, & Bulfin, 2008).

The study reported on in this paper aimed to investigate the broader milieu of secondary school students' technology practices to demonstrate the complex network of contextual and circumstantial influences on students' technology practices. This study advances knowledge by investigating young peoples' technology practices, taking into account the varied contexts in which technology use occurs guided by the sociological theory. This paper details one case from the broader study to provide an in-depth account of one student's technology practices in relation to his social contexts.

The study

The findings presented in this paper are drawn from a broader multiple embedded qualitative case study of students in years 9 and 10 from two public secondary schools in Australia (Figure 1). The study aimed to investigate secondary school student's practices with and value of technologies at school and in their everyday lives (Beckman, Bennett, & Lockyer, 2014). This paper presents data from a single case study of a student, Byron, chosen from the varied set of 12 student cases. This paper focuses on this single case in order to depict rich descriptions of the students' technology practices with consideration to the social contexts. The findings from this case demonstrate the various social contexts in which the student participates and how this influences his technology practices.

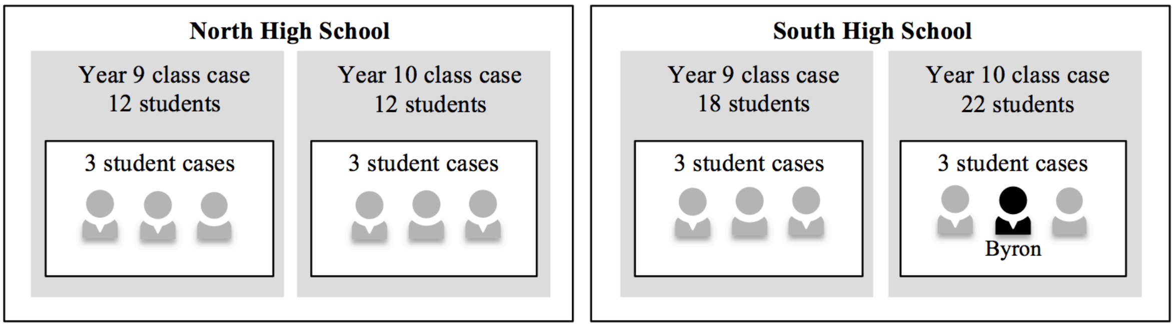

Figure 1. Study design depicting class (4) and student cases (12) within the two secondary schools.

The study involved two phases: two class cases from each school (64 students). Background data was collected using an open-ended questionnaire data from all students. Three students were selected from each class case as individual cases. Student cases were selected through purposeful maximal sampling (Creswell, 2007), based on data from the background questionnaire, with the aim to include variation in students' family backgrounds, and access, use and perceptions of technology. Multiple data sources were collected from student cases including a technology diary recording details of all technologies used over a two week period as well as two one-on-one interviews before (initial) and after (final) the completion of the technology diary. The theoretical framing and exploratory nature of the study guided the design of the data collection tools. The data was first analyzed using categorical aggregation to establish themes and patterns, followed by a second level of data analysis guided by Bourdieu's theoretical constructs.

Conceptualizing technology practices using Bourdieu's sociological theory

In order to achieve a holistic understanding of students' technology practices, considering the milieu in which these practices occurred, Bourdieu's sociological concepts, field, habitus and capital, guided the study (Bourdieu, 1990).

Field, habitus and capital are theoretical constructs through which to understand social practice, specifically in this study, technology practices. These relational concepts allow the researcher to explore the antecedent factors that give rise to practices. For Bourdieu, practices are a result of an individual's background, circumstances, dispositions (habitus), material and symbolic assets (capitals) within the social arena (field) in which the practices occur. He formally summarizes this relation as: '[(habitus) (capital)] + field = practice' (Bourdieu, 1986).

This sociological framing was used in the study as a methodological tool, informing the design of the data collection tools and guiding the analysis of the data. Specifically, all student descriptions of technology practices were collected with consideration to the contexts in which they occurred. For example, the technology diary provided opportunities to collect a range of situational data including the location, time, other individuals involved, and the nature and reasons for use. Additionally, the researcher prompted students for detailed accounts of technology practices during interviews, as well as using the technology diary as a stimulus for discussion in the final interview, gaining in-depth descriptions of technology practices.

Findings – The case of Byron

Byron, a Year 10 student, attended a public secondary school in regional Australia. The school was ranked slightly lower than the Australian average in the level of education and occupation of the students'

parents (ACARA, 2013); slightly lower in family income than the Australian national median (ABS, 2011); in an area where 65% of households were connected to the Internet (15% lower than the Australian average).

Byron had access to a range of technologies in his everyday life, including: a laptop issued by the school, as part of the *Laptops for Learning* initiative, (DEC NSW, 2012), a personal laptop and desktop computer, the Internet, an iPod, a smart phone, a games console and cameras (initial interview). Byron used technologies frequently, particularly for practical purposes such as organizational tools, and for communication and learning. He was interested in technologies and planned to pursue a career in the field, "I want to get into the IT industry so I'm just interested in computers" (final interview).

Practices by field

Bourdieu used field as a spatial metaphor for the structure and systems of the social contexts and the individuals that occupy and define them. Fields are contingent on the individuals that occupy them and thus are not static but can evolve (Bourdieu & Wacquant, 1992). The secondary school student participants of this study occupied two main fields: outside school and at school.

Technology practices outside school

Byron described himself as a high user of technology, using technology every day. Outside of school he used technology, usually at home, for education related purposes, as well as for socializing and leisurely activities. Table 1 presents data from Byron's technology diary and the two interviews, detailing three devices Byron spent the most time using outside of school and the kinds of activities he engaged.

Device	*Everyday life uses:*	*Education related uses:*
Laptop computer	Downloading and listening to music, social networking sites (SNS), email, Skype and internet browsing.	Schoolwork including homework and assignments.
Smart phone	SNS, playing games, take photos	Organizational applications including alarm clock and timetable for school
iPod	Listening to music	

Table 1. Summary of technology devices and applications Byron used outside of school.

Within the home field, it is the individuals that occupy the field that determine the structures and systems that influence practice. Byron lived with his mother, an aged care worker. His mother enjoyed using technology everyday for leisure purposes, including playing games, and occasionally for practical purposes like checking pay slips online or emails (initial interview). Byron explained that there were few rules that dictated his use of technology at home. He was able to use technology when and where he preferred, usually using his laptop in his bedroom. Byron's mother's occupation suggested that his family had a relatively low socioeconomic status. In the home field, Byron had access to a desktop computer, laptop, school-issued laptop, Internet, iPod, smart phone and games console (initial interview). Byron's interest in technology had driven the purchase of technologies in his home field, for example he requested a laptop as a gift when he began high school. While these technologies allowed him to complete most tasks, they limited his use. During interviews Byron discussed the affordability of certain technologies, and expressed aspirations of being able to afford technologies, including an iPad.

Byron also spent time on weekends with his sibling, a younger sister, who lived with their father and attended a private secondary school in a nearby suburb. He did not disclose his father's occupation or use of technology during the interviews, but did describe his sister's frequent use of technologies, including her school-issued laptop and iPad. Byron also frequently spent time with his grandparents, to whom he said he often provided technology support.

Within Byron's home field he was dominant in the use of technologies. He used the most up to date technologies in the home (using laptops rather than an older desktop computer) and strongly influenced the culture of technology use. Byron described his position in the home field as being more knowledgeable and skilled than those around him, and often assisted family friends and his grandparents with technology related problems, "[Nan] didn't know how to [set up the Wi-Fi]. I did it for her so that way it was all set up and because my Nan and Pop aren't real confident with the computer they ask for help all the time" (final interview). Despite his interest in technology and frequent technological assistance, he reluctantly described himself as an expert, acknowledging some technological skills and knowledge with which he was not confident.

Technology practices at school

At school Byron used his school-issued laptop everyday for learning. As with all students involved in the study, he used his laptop at school to take notes, write and complete research online (interviews and technology diary). However, Byron explained that he had recently started writing his school work in a book again. He explained that his computer kept breaking down and was sent away to be repaired. A decline in his grades in Science had also prompted his return to handwritten notes, as he explained, "When I did all my work in science on the laptop I found that my grades were going down but when I started using my book it came back up again. It's just a bit weird so I just chose to use my book" (final interview). Byron also used his smart phone at school to manage his schedule, keeping track of subjects with a timetable application. He also used his smart phone on a few occasions to access the Internet, with his teachers' approval, when his laptop was not working. Byron rarely used technology for non-educational purposes while at school, only listening music occasionally in class when he had completed his work.

Byron described himself as capable with all uses of technology at school and enjoyed using technology for learning. However, within the school field Byron was not as confident in his ability to troubleshoot and solve problems with his laptop. He described seeking assistance from a teacher when there was a technical problem with his laptop at school. The findings suggest that in the school field the position of Byron's technical expertise is lower than that in his home field. This was demonstrated in his inclination to seek assistance from others rather than try to solve the problem himself, as he would at home. Thus, demonstrating that the social field influences his practices.

Habitus

Habitus is defined as an internalized structure that determines the way an individual acts, feels and thinks (disposition) shaped by their past and present experiences and circumstances. Individual are constantly consumed in experiences and thus affected by them "in a way that either reinforces or modifies its structures" (Bourdieu & Wacquant, 1992).

Experiences using technology at an early age were enduring for Byron. His first experience with learning technologies was at primary school where "teachers… [would] show us all that sort of stuff; it was pretty cool" (final interview). He described how these experiences inspired his interest in technologies. These technology experiences thus shaped his habitus, broadening his thinking about technologies. Bryon's interest, as a result of these experiences, also prompted the purchase and use of technologies within the home. In the home, Byron occupied a principal position in relation to technology practices, where he taught himself and experimented with new technologies. For example, after hearing about Skype from a friend, Byron's curiosity and interest led him to learn about and experiment with the new technology at home, recalling, "I just heard about it; my mum's friend had it so she said to try and get it so we could talk to her and it was really good" (initial interview).

Technology was not just an interest of Byron's. He described his aspirations to pursue a career related to information technology. His use of technology was practically oriented. He particularly liked using navigation devices and organizational applications on his smart phone for school. He also enjoyed providing technological support for his grandparents and family friends, such as assisting with setting up Wi-Fi and printers. These successful experiences have structured his habitus in everyday life.

Despite his early positive experiences at primary school, his experiences with technology at high school had not been as positive. Byron experienced a number of technical problems with his school-issued laptop that led to him losing schoolwork and notes and not having access to a laptop for weeks at a time. Byron also mentioned that he felt his grades at school had suffered as a result of using a laptop in class frequently. These negative experiences made Byron more cautious about his use of the laptop at school for learning.

Capitals

Capital is the currency of the field. Capital is only of value or 'exists through esteem, recognition, belief, credit, confidence of others' in the field (Grenfell, 2009). Bourdieu describes multiple forms of capital including economic, cultural and social capital.

Economic capital relates to the economic wealth and associated physical assets. Byron did not generate an income, but assumed that of his parents. Thus the economic capital of his family determined the technological resources available in the home. The findings suggested that the economic capital within Byron's

home was sufficient to provide access to computers and the Internet. Although, Byron discussed the affordability of technologies, as discussed above, as a future aspiration.

Cultural capital is a symbolic form of capital manifested through “knowledge, skill, taste, lifestyle, and qualifications” (Everett, 2002). Cultural capital is acquired through socialization (exposure to cultural goods and practices) and training. Byron’s career aspirations (habitus) resulted in him investing time in learning technology related skills at home (embodied cultural capital). Byron expressed interest in engaging in formal information technology studies at school (institutionalized cultural capital), although his school did not have teaching staff available with the necessary subject expertise to offer the subject. School was a site for socialization (objectified cultural capital) into technology practices for Byron. He had described influential experiences in primary school and teachers at high school who assisted him with technical problems and exposed him to new software and applications. His friends too were agents of socialization, introducing him to new technologies including Skype.

Social capital is defined as the power that results from networks of support and relationships (Everett, 2002). Teachers and peers comprised Byron’s support networks. However, at home he had very limited supports. Byron mentioned that when faced with technological difficulties at home he would “just leave it alone and come back to it another time” (final interview). This limited support network is important to consider because of the magnifying nature of social capital. Having fewer contacts or support networks has the potential to magnify the inequalities in capitals, thus Byron may have fewer opportunities to develop his cultural capital than someone with a more extensive network of social supports.

Discussion

Practices with technology are not a result of any one factor. The findings from this case demonstrate that Byron’s technology practices were a result of an intricate network of personal, cultural and social experiences and circumstances. This is consistent with a relatively small body of sociological research demonstrating the influence of contextual factors such as socioeconomic status (North, et al., 2008) and experiences within the home (Johnson, 2009) on students’ technology practices.

The findings of this study develop our understanding of contextual influences by illuminating nuances in practices across social fields. Byron’s use of technology was dependent on the social contexts. His use of technologies outside of school was diverse. He took risks, experimented and was generally very positive and confident in his use. While at school he was skeptical about the use of his school-issued laptop to store all notes and school work and was not as confident with solving technological problems. A recent case study of tertiary students in South Africa (Czerniewicz & Brown, 2013) also utilized Bourdieu’s theory to understand students’ varied technology practices as they navigated between social fields of home and university. While the tertiary students in this study were able to bridge gaps in access to resources and values by utilizing technologies available to adapt to the university field, the high school students in this study have less flexibility. This in turn has implications for education.

Consideration of the milieu, yielding rich descriptions of practice, allows us to determine the positive influencing factors, such as teachers as agents of socialization, and highlight those that limit his possibilities, like limited familial capital. Thus, the findings presented in this paper have strong practical implications for the use technology in schools, demonstrating the power of educational experiences in shaping a students’ habitus and developing cultural capital. Through exposure to technologies and technology practices at school Byron’s perceptions, disposition and skills and knowledge of technology were shaped positively. Thus, schools have a role to play in effecting change and overcoming some student inequalities in technology practices.

Furthermore, a deeper understanding through Bourdieu’s sociological framework allows us to consider future practices and ways in which we can evolve the school field to be more conducive to effective technology practices for learning.

The application of Bourdieu’s sociological theory in this study has demonstrated its utility in exploring the complex and social nature of students’ technology practices; and as a tool to understand the role of schools in effecting students’ practices. As other educational technologists have asserted (Bennett & Maton, 2010; Oliver, 2013; Selwyn, 2012), there is undoubtedly scope for more studies that explore the sociology of educational technology.

Conclusion

In considering Byron's case, the findings add to the growing body of literature that acknowledges the complex nature of students' technology practices (Bennett, Maton, & Kervin, 2008; Eynon & Malmberg, 2011). Moreover, through the lens of Bourdieu's concepts the paper has highlighted the social nature of technologies, where Byron's practices were inextricably linked to the social contexts in which they occurred. The rich description yielded from this case study demonstrates the value of sociological theory in educational technology research to provide deeper understandings with the potential to address student inequalities.

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Appendix D: Teacher interview protocol

Time: Date: Location:
Interviewee:

INTRODUCTION

Hi [name of participant], my name is Karley. Thank you for taking the time to have this interview with me today. The aim of this project is to gain an understanding of students' use and perceptions of technology in school and in everyday life. I'd like to chat with you about the ways that technology is used in the school and specifically in your classroom to help shed light on the students' practices with technology. This interview will take about 30 minutes.

I would like to remind you that your participation in this project is voluntary and confidential. I would also like to remind you that do not need to reveal any illegal activity. Would you mind if I record this conversation so that I can listen to you rather than taking notes?
Before we start do you have any questions for me?

INTERVIEW QUESTIONS

- Referring to the list of technologies:
    a. From this list of technologies, what have you used in your teaching?
    b. Is there anything else that you use that is not on the list?
    c. Which of these would you say that you use weekly in your teaching? What kinds of activities do you use them for?
    d. Does this mean that you don't use these technologies left on the list? Why?
- Referring to the next list – the list of technology uses, what activities would you say you use the most in your teaching? What classes? Why?
- Can you tell me about other ways you integrate technology into your teaching? Prompt from the list of uses of technology if required:
    a. Is there anything on this list that you don't do? Why?
- What technology devices do the students in your class bring to school?
- What do you see as the students' interests in regards to technology?
- What information technology skills and knowledge do they bring to school?

- Is there any skills or knowledge that you find students are lacking in regards to how technology is used at school?
- What do you want your students to get out of the use of technology in teaching and learning?
    a. What place does technology have in education?
    b. Do you think there should be limitations on the ways that it is used?

Thank you for sharing your ideas with me and for your time to participate in the interview. I'll see you again [details of next interaction].

LIST OF TECHNOLOGIES

Desktop computer
Laptop computer
School-issued laptop computer
Broadband internet
iPad or other handheld computer
iPod or mp3 player
Mobile phone with or without internet access
Television connected to the internet
Games console with or without internet access
Digital still camera
Digital video camera
Video conferencing
Interactive whiteboard

LIST OF TECHNOLOGY USES

Emailing
Playing online games
Listening to or downloading music
Watching or downloading videos
Internet shopping
Writing
Online research
Lesson delivery
Student presentations
Creating website or blog
Creating a podcast
Creating or uploading videos
Making phone calls online, including video conferencing
Chat rooms, forums or instant messaging
Visiting or using social networking sites
General internet surfing or web browsing

Appendix E: Student questionnaire

TECHNOLOGY USE QUESTIONNAIRE

Name: ______ Age: ______ Sex: ☐ Male ☐ Female

School: ______ Year: ______

Who do you live with? (e.g. mum, stepdad, an older brother and younger sister)

Person 1: ______ Person 4: ______
Person 2: ______ Person 5: ______
Person 3: ______ Person 6: ______

What are their occupations? (Leave blank if the person does not work)

Person 1: ______ Person 4: ______
Person 2: ______ Person 5: ______
Person 3: ______ Person 6: ______

How often do you use these technologies **at home**?
(please ✓)

	How often do you use it? Everyday	Some-times	Never	I don't have @ home
e.g. Desktop computer	⬭	✓	⬭	⬭
Desktop computer	⬭	⬭	⬭	⬭
Laptop computer	⬭	⬭	⬭	⬭
School laptop	⬭	⬭	⬭	⬭
Internet - Broadband	⬭	⬭	⬭	⬭
Internet – Dial up	⬭	⬭	⬭	⬭
iPad or other handheld computer	⬭	⬭	⬭	⬭
iPod or mp3 player	⬭	⬭	⬭	⬭
Mobile phone with Internet access	⬭	⬭	⬭	⬭
Mobile phone (without Internet)	⬭	⬭	⬭	⬭
Games console connected to the Internet	⬭	⬭	⬭	⬭
Games console (not connected)	⬭	⬭	⬭	⬭
Digital still camera	⬭	⬭	⬭	⬭
Digital video camera	⬭	⬭	⬭	⬭
Others:	⬭	⬭	⬭	⬭

What do YOU use technology most for at school and WHY?

What do YOU use technology most for outside of school and WHY?

Describe yourself as a technology user (e.g. I am interested in …, I am good at …, I enjoy …, I don’t like… etc.)

Who else uses technology in your home and what for?

Do you think technology is an important part of how you learn? Why/why not?

Additional comments about how you use technology at school and in everyday life or about what technologies you think are important for you.

Thank you for being a part of this research ☺

Appendix F: Alignment of the questionnaire items with Bourdieu's theory of practice

Questionnaire item	*Alignment with Bourdieu's theory of practice*
1. Who do you live with?	• Characterising the home field
2. What are their occupations?	• Characterising the home field • Expected income (economic capital) • Likelihood of technology practices for work (cultural capital)
3. How often do you use these technologies at home?	• Characterising the home field • Technology devices available (economic capital) • Student disposition toward technology practices (habitus)
4. What do you use technology most for at school and WHY?	• Student disposition toward technology practices (habitus) • Characterising the school field
5. What do you use technology most for outside of school and WHY?	• Student disposition toward technology practices (habitus) • Characterising the home field
6. Describe yourself as a technology user.	• Student disposition toward technology practices (habitus)
7. Who else uses technology in your home and what for?	• Characterising the home field • Family members disposition toward technology practices (habitus), their technological skills and knowledge (cultural capital) and opportunity for potential technological support to the student (social capital)
8. Do you think technology is an important part of how you learn? Why/why not?	• Student disposition toward and perspective of technology practices for learning (habitus)

Appendix G: Initial semi-structured student interview protocol

Time: Date: Location:
Interviewee:

INTRODUCTION

Hi [name of participant], my name is Karley. The aim of this project is for young people, like you, to inform educators and researchers how you use technology at school and in your everyday life. I'd like to chat with you about the ways that you use technology and what you think about how technology is used at your school.

I would like to remind you that your participation in this project is voluntary and confidential. I would also like to remind you that I am not interested in any possible illegal activity, for example things like illegally downloading movies, so please don't mention these kinds of activities in our discussion today. Would you mind if I record this conversation so that I can listen to you rather than taking notes?
Before we start do you have any questions for me?

INTERVIEW QUESTIONS

Participant technology use

Referring to the list of technologies:

- From this list of technologies, is there any there that you have not used? Why don't you use them?
- Which of these do you use at school?
- Which of these do you use in everyday life and where do you use them?
- Which of these technologies would you say you use the most? What for?
- Is there anything else that you use that is not on the list? What do you use that for?
-
- How often do you use computers? What for?
- How did you learn to use a computer and the Internet?

Family technology use

- Who uses the computer at home and what for? Does anyone else in your family use other technologies that you know of? What do they use it for?

Technology related activities

Referring to the list of technology uses:

- Is there anything on this list that you don't do? Why?
- What activities would you say you do the most? When and where do you do these? What for?
- Do you do any of these activities at school? What classes do you use these in? What for? How often?
- What kinds of technologies and activities do you use most at school?
- What technologies would you like to use at school as part of your learning?
- Do you think technology is used at your school well? Is there any ways that it could be improved?

CONCLUDING THE INTERVIEW

Give the participant the technology diary and remind them that participation is voluntary and they have the right to withdraw.
Discuss the kinds activities that should be recorded in the diary, when and how to complete the diary.

Thank you for sharing your ideas with me and for your time to participate in the interview. I'll see you again [details of next interaction].

LIST OF TECHNOLOGIES

Desktop computer
Laptop computer
School-issued laptop
Broadband internet
iPad or other handheld computer
iPod or mp3 player
Mobile phone with or without internet access
Television connected to the internet
Games console with or without internet access
Digital still camera
Digital video camera
Video conferencing
Interactive whiteboard

LIST OF TECHNOLOGY USES

Emailing
Playing online games
Listening to or downloading music
Watching or downloading videos
Internet shopping
Schoolwork
Creating website or blog
Creating a podcast
Uploading videos
Making phone calls online
Chat rooms, forums or instant messaging
Visiting or using social networking sites
General internet surfing or web browsing

Appendix H: Alignment of the initial semi-structured student interview questions with Bourdieu's theory of practice

Interview question	*Alignment with Bourdieu's theory of practice*
From this list of technologies, is there any there that you have not used? Why don't you use them? • Which of these do you use at school? • Which of these do you use in your everyday life and where do you use them? • Which of these technologies would you say you use the most? What for? • Is there anything else that you use that is not on the list? What do you use that for?	• Student experiences with technology (habitus and capital) • Student disposition toward technology practices (habitus) • Characterising the school field • Establishing and characterising fields in which students use technologies
How often do you use computers? What for?	• Student experiences with technology (habitus and capital) • Student disposition toward technology practices (habitus)
How did you learn to use a computer and the Internet?	• Student's past experiences with technology (habitus and capital)
Who uses the computer at home and what for? Does anyone else in your family use other technologies that you know of? What do they use it for?	• Characterising the home field • Family members disposition toward technology practices (habitus), their technological skills and knowledge (cultural capital) and opportunity for potential technological support to the student (social capital)

Is there anything on this list that you don't do? Why? What activities would you say you do the most? When and where do you do these? What for?	• Student experiences with technology (habitus and capital) • Student disposition toward technology practices (habitus)
Do you do any of these activities at school? What classes do you use these in? What for? How often?	• Characterising the school field • Student disposition toward technology practices in the school field (habitus)
What kinds of technologies and activities do you use most at school?	• Characterising the school field
What technologies would you like to use at school as part of your learning?	• Student disposition toward technology practices in the school field (habitus)
Do you think technology is used at your school well? Is there any ways that it could be improved?	• Student disposition toward technology practices in the school field (habitus)

Appendix I: Example of final semi-structured student interview protocol

Time: Date: Location:

Interviewee:

INTRODUCTION

Hello [name of participant]. It's good to see you again. Thank you so much for the great effort you put into your technology diary. It was really insightful to look at and gave me lots of ideas and questions. I'd like to have a look at your technology diary together and ask you some questions about it.

I would like to remind you that your participation in this project is voluntary and confidential. I would also like to remind you again that I am not interested in any possible illegal activity so please don't mention these kinds of activities in our discussion today. Would you mind if I record this conversation so that I can listen to you rather than taking notes?

Before we start do you have any questions for me?

QUESTIONS/PROMPTS

Clarifications

- To start with there were a couple of things I was unsure about in your technology. Could we go through so you can clear these up for me?

[Address items marked in diary]

Regular technology practices

Using the summary of technology uses and the technology diary:

- Would you say that this is typical of the kinds of thing you usually do?
- Is there anything at school you do that you perhaps didn't do over these two weeks?
- Is there anything outside of school that you do that you perhaps didn't do over these two weeks?

Patterns of technology use

- You only use technology twice in the mornings before school for schoolwork. Can you tell me more about why you usually do not use technology in the mornings? Why did you use technology on these days?
- There were five school days, Tuesday, Thursdays and one Monday that you did not use technology. Is this typical that you do not use technology on these days?
- You only used technology at school during class. Do you ever use technology at school for everyday stuff?
- When you were at home you seemed to use technology for both school and everyday stuff. Would you say you spend an even amount of time on both kinds of activities? Do you have other schoolwork/homework that does not involve technology?
- You use quite a bit of technology on the weekends. Can you tell me more about the kinds of things you do?
- It seems you usually used technology on your own. Do you usually use technology alone?
- What does a typical afternoon/night look like in your house?
- Where are you in the house?
- If you are by yourself, what is everyone else in the house doing?
- It seems that you use your phone mostly on the weekends. Do you feel that is correct? Why? Did you use your phone more than you recorded?

Points of interest

- I found it really interesting that you contact your friends through Facebook but you also sent an email about a Geography assignment. Can you tell me about why you chose email to communicate with your friend?
- You didn't use a phone (except once) over the two weeks. Can you tell me about that?
- When you were at home you seemed check Twitter and your email almost every morning and afternoon. Can you tell me more about how/why you use these?
- I find it interesting that you do not use any other social networking sites. Why do you prefer Twitter?

Others' technology practices

- Would you say that you use technology in a similar way to your friends?
- Is there anything you do differently?
- Is there anything they do that is different to how you use technology?

- What technology is most important to you? Why?
- What technology is most useful for you for learning? Why?
- Do you think your teachers understand what kinds of technologies are important to you?

REVIEW OF THE DATA COLLECTION TOOLS

Was there any part of the technology diary that you had trouble with?

Did you find the list of activities matched what you were doing each day?

How often did you fill in the diary?

Did you find it difficult or time consuming to fill in each day?

Thank the participant once again for being part of the study.

Appendix J: Alignment of the sample final semi-structured student interview questions with Bourdieu's theory of practice

Interview question	*Alignment with Bourdieu's theory of practice*
Would you say that this is typical of the kinds of thing you usually do? Is there anything at school you do that you perhaps didn't do over these two weeks? Is there anything outside of school that you do that you perhaps didn't do over these two weeks?	• Student disposition toward technology practices (habitus) • Characterising the school and everyday life fields
You only use technology twice in the mornings before school for schoolwork. Can you tell me more about why you usually do not use technology in the mornings? Why did you use technology on these days?	• Student disposition toward technology practices (habitus)
You use quite a bit of technology on the weekends. Can you tell me more about the kinds of things you do?	• Student disposition toward technology practices (habitus)
What does a typical afternoon/night look like in your house?	• Characterising the home field • Family members' disposition toward technology practices (habitus)

I found it really interesting that you contact your friends through Facebook but you also sent an email about a Geography assignment. Can you tell me about why you chose email to communicate with your friend?	• Student skills and knowledge (cultural capital) and preferences (habitus)
Would you say that you use technology in a similar way to your friends?	• Friends' dispositions toward technology practices (habitus) • Friends technological skills and knowledge (cultural capital) and opportunity for potential technological support to the student (social capital)
What technology is most important to you? Why?	• Student beliefs about and disposition toward technology practices (habitus)
What technology is most useful for you for learning? Why?	• Student beliefs about and disposition toward technology practices (habitus)
Do you think your teachers understand what kinds of technologies are important to you?	• Student beliefs about technology practices for learning at school (habitus) • Student and teacher positions in the school field

Appendix K: Sample of initial analysis matrix of student technology diary data for final student interview

Home/Other

School related practices

Everyday life related practices

Maths text book	Facebook	Pinterest
Maths text book	Facebook	Pinterest
Writing – essay	Facebook	Pinterest
Writing – essays	Facebook	Listen to music
Writing - essay	Facebook	Listen to music
Email homework	Facebook	Listen to music
Woomoo	Facebook	Listen to music
Internet research	Facebook	Listen to music
Internet research	Facebook	Listen to music
Internet research	Facebook	Download music
Internet research	Instagram	Download music
Internet research	Instagram	Download music
YouTube – guitar tutorial	Instagram	
Writing – essay	Instagram	
Writing – essay	Instagram	
Writing – essay		
Writing – assignment		
Writing – homework	Phone	Work
Writing - mind map	Phone	Work
Writing - PowerPoint	Phone	Work
Writing – PowerPoint	Phone	Work
Keyboard	Phone	YouTube
Study from notes	Phone	Play game
Study from notes	Phone	Camera
	Phone	Video camera
	Phone	Watch TV
	Phone	
	Phone	

Internet research – English	
Internet research – History	
Internet research – History	
Internet research - Music	
Internet research - Music	
Internet research - Music	
Internet research – Food Tech	
Internet research – Food Tech	
Woomoo - English	
Writing – History	
Writing – History	
Writing – English	
Writing – English	
Writing – Geography	
Writing – Geography	
Writing – Geography	
Writing – Geography	
Writing – Science	
Writing – Science	
Email	
Email	
Email	
Watch video – Science	
Watch video – History	
Watch video – English	
Get marks online	
Phone	

School

Appendix L: Sample of one day from student technology diary

What you need to do…

- ✓ Fill in the diary EVERYDAY, at <u>least</u> once a day
- ✓ Try to give as much information as you can when filling in the diary
- ✓ Tick as many boxes as you need to

Things I should include as technology…

- ✓ Any kind of technology you use at school
- ✓ Any kind of technology you use for communicating
- ✓ Any kind of technology you use to get information
- × Not watching the television
- × Not any kitchen appliances or things like that

What do I do if…

I'm not sure how to record what I have done…
You can just write what you need to in a space on the page/back of the page (there are no wrong answers!) or text or call Karley ____________ with your question.

I used more than one kind of technology…
Fill in all the boxes for all the kinds of technology you have used and the things you have used them for.

I lost my diary…
Tell your teacher so they can contact Karley as soon as possible and she will arrange a replacement.

Remember… there are no wrong answers. Just write down what you have done.

Where are you? ☑ Home ☑ Other: *Friend's place*

Afternoon

I have: ☐ **I haven't used technology this morning.**

Activity…	What did you do/use	For…		With…
Mobile Phone	☑ Msg ☐ Phone calls	☐ School stuff ☑ Everyday stuff		
Email, Skype, or other online communication	*Skype*	☐ Set by teacher ☑ Extra school work ☐ Everyday stuff	*Chat about an assignment*	*Friends*
Facebook or social networking	*Facebook*	☐ Set by teacher ☑ Extra school work ☑ Everyday stuff	*Look and post*	*Myself*
Internet - general browsing		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Play games		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Download or listen to music & video		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Writing	*Write - MS word*	☑ Set by teacher ☐ Extra school work ☐ Everyday stuff	*Poem for English*	*Myself*
Others:	*Help Mum*	☐ Set by teacher ☐ Extra school work ☑ Everyday stuff	*How to fix the printer*	*Mum*

Day one…
Look at the instructions if you're not sure…

M T W T F S S M T W T F S S

Morning

Where are you? ☐ Home ☐ Other:

I have: ☐ **I haven't used technology this morning.**

Activity…	What did you do/use	For…		With…
Mobile Phone	☐ Msg ☐ Phone calls	☐ School stuff ☐ Everyday stuff		
Email, Skype, or other online communication		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Facebook or social networking		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Internet - general browsing		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Play games		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Download or listen to music & video		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Writing		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Others:		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		

Day one…

Look at the instructions if you're not sure…

M T W T F S S M T W T F S S

At School

I have: ☐ **I haven't used technology at school today.**

Activity…	What did you do/use	Subjects	For…		With…
Mobile Phone	☐ Msg ☐ Phone calls		☐ School stuff ☐ Everyday stuff		
Email, Skype, or other online communication			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Facebook or social networking			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Internet - general browsing			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Play games			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Download or listen to music & video			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Writing			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Others:			☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		

M T W T F S S M T W T F S S

Where are you? ☐ Home ☐ Other:

Afternoon

I have: ☐ **I haven't used technology after school today.**

Activity…	**What did you do/use**	**For…**		**With…**
Mobile Phone	☐ Msg ☐ Phone calls	☐ School stuff ☐ Everyday stuff		
Email, Skype, or other online communication		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Facebook or social networking		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Internet - general browsing		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Play games		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Download or listen to music & video		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Writing		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		
Others:		☐ Set by teacher ☐ Extra school work ☐ Everyday stuff		

Check

… Did you complete all parts of your diary today?

M
T
W
T
F
S
S
M
T
W
T
F
S
S

Appendix M: University of Wollongong Human Research Ethics Committee ethics approval

University of Wollongong

APPROVAL after review - SERAP
In reply please quote: HE11/498
Further Enquiries Phone: 4221 3386

1 March 2012

Ms Karley McKeowen
3 Midgley Street
CORRIMAL NSW 2518

Dear Ms McKeowen,

Thank you for your response to the HREC review of the application detailed below. I am pleased to advise that the application has been approved and forwarded to the Department of Education and Training for approval of your SERAP application.

Ethics Number:	HE11/498
SERAP Number:	2011250
Project Title:	An investigation of student practices and value of technologies at school and in everyday life
Researchers:	Ms Karley McKeowen, A/Professor Susan Bennett, Professor Lori Lockyer
Approval Date:	1 March 2012
Expiry Date:	28 February 2013

The University of Wollongong/Illawarra Shoalhaven Local Health District Social Sciences HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research. The HREC has reviewed the research proposal for compliance with the National Statement and approval of this project is conditional upon your continuing compliance with this document.

A condition of approval by the HREC is the submission of a progress report annually and a final report on completion of your project. The progress report template is available at http://www.uow.edu.au/research/rso/ethics/UOW009385.html. This report must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date. As evidence of continuing compliance, the Human Research Ethics Committee also requires that researchers immediately report:

- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforseen events that might affect continued ethical acceptability of the project.

Research Services Office University of Wollongong NSW 2522 Australia
Telephone +61 2 4221 3386 **Facsimilie** +61 2 4221 4338
research_services@uow.edu.au www.uow.edu.au/research

Please note that approvals are granted for a twelve month period. Further extension will be considered on receipt of a progress report prior to expiry date.

If you have any queries regarding the HREC review process, please contact the Ethics Unit on phone 4221 3386 or email rso-ethics@uow.edu.au

Yours sincerely

A/Professor Garry Hoban
Chair, Social Sciences
Human Research Ethics Committee

cc: A/Professor Susan Bennett, Faculty of Education

Research Services Office University of Wollongong NSW 2522 Australia
Telephone +61 2 4221 3386 **Facsimilie** +61 2 4221 4338
research_services@uow.edu.au www.uow.edu.au/research

Appendix N: New South Wales Department of Education and Communities ethics approval

NSW GOVERNMENT | Education & Communities

Miss Karley McKeowen
3 Midgley St
CORRIMAL NSW 2518

DOC 12/97546

Dear Miss McKeowen

SERAP Number **2011250**

I refer to your application to conduct a research project in New South Wales government schools entitled *An investigation of student practices and value of technologies at school and in everyday life*. I am pleased to inform you that your application has been approved. You may now contact the Principals of the nominated schools to seek their participation. **You should include a copy of this letter with the documents you send to schools.**

This approval will remain valid until 28/02/2013.

The following researchers or research assistants have fulfilled the Working with Children screening requirements to interact with or observe children for the purposes of this research for the period indicated:

Name	Approval expires
Karley Alice McKeowen	28/02/2013
Susan Jane Bennett	21/03/2013
Lori Lockyer	29/03/2013

I draw your attention to the following requirements for all researchers in New South Wales government schools:

- School Principals have the right to withdraw the school from the study at any time. The approval of the Principal for the specific method of gathering information for the school must also be sought.
- The privacy of the school and the students is to be protected.
- The participation of teachers and students must be voluntary and must be at the school's convenience.
- Any proposal to publish the outcomes of the study should be discussed with the Research Approvals Officer before publication proceeds.

When your study is completed please forward your report marked to Manager, Schooling Research, Department of Education and Training, Locked Bag 53, Darlinghurst, NSW 2010.

Yours sincerely

Bill Tomlin
Acting Senior Manager
Student Engagement and Program Evaluation
27 March 2012

Student Engagement and Program Evaluation Bureau NSW Department of Education and Communities
Level 3, 1 Oxford Street, Darlinghurst NSW 2010 – Locked Bag 53, Darlinghurst NSW 1300 Telephone: 02 9244 5619– Fax: 02 9266 8233 – Email: serap@det.nsw.edu.au

Appendix O: Teacher participant information sheet

University of Wollongong

TEACHER INFORMATION SHEET

Research Project
An investigation of students' practices and value of technologies at school and in everyday life

Dear Teacher,

My name is Karley McKeowen and I am currently undertaking a Doctor of Philosophy research study within the Faculty of Education at the University of Wollongong. I would like to invite you and your class to take part in this study being supervised by Associate Professor Sue Bennett and Professor Lori Lockyer. The broad aim of the research project is to gain a better understanding high school students' use of technology at school and in everyday life and the value they place on these technologies in order to assist policy makers and educators to more effectively integrate technology into the curriculum in a meaningful, relevant and engaging manner.

The information from the study will be used to provide valuable descriptions about students' experiences with technology and the factors that impact upon their technology use. Understanding these experiences will assist schools and educators in enhancing teaching and learning experiences in order to better develop young people as successful learners, creative individuals and informed 21st century citizens. We will report the results directly to the principal and teaching staff involved in the project. Academic and professional publications will also be developed to report the results to the broader research community.

Specifically, we are seeking teachers who are willing to assist with the following data collection activities with one of their year 9 or 10 classes during Term 3, 2012:

- The facilitation of a 20-minute questionnaire with each class asking questions in regards to their family background, access to and use of technology in everyday life
- Participate in a 30-minute one-on-one interview between the teacher and researcher about how technology is used in their classroom and the school
- Assist to schedule two 30-40 minute interviews with 3 students within their class about the students use of and value of technology at school and in everyday life
- Facilitate the collection of relevant school documents such as the school plan.

The research has been designed to have minimal impact upon the school, teaching staff and students. The principal researcher who is an experienced classroom teacher will conduct all data collection activities, the teacher's involvement in the study will be to assist with the time scheduling of these activities.

With your permission and the permission of the students in your class and their parents, we will ask your students to participate in the study. Students will be selected to participate in the interview based on their responses in the questionnaire and with your consultation. The interviews will involve participating students discussing their technology use and perspectives with the researcher. All interviews will be audio taped and later transcribed for accuracy. These students will also be asked by the researcher to keep a technology diary for two-weeks, however, this will be completed in the students own time. Data collection will occur within the school, the

questionnaire in your classroom and interviews in a location within the school during Term 3, 2012.

Please note that this research does not aim to uncover any illegal activity; therefore, you and the participating students are encouraged to refrain from mentioning any illegal activities involving technology during the data collection.

Your participation in this study is voluntary and you may withdraw at anytime by contacting Karley McKeowen, or any of the researchers. If you do decide not to take part, even after the study has started it will not affect your relationship with the University of Wollongong or your school. Should you withdraw from the study any data already collected will be destroyed.

Data collected from the study will remain confidential and be available only to the researchers. Data will be stored securely in the Faculty of Education for at least five years to conform to the University's Code of Practice-Research and the joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997) and then destroyed.

When you have read this information the chief researcher, Karley McKeowen will be available to answer any questions you may have. If you would like to know more at any stage, please feel free to contact any of the researchers (see contact details below). Concerns or complaints regarding the way in which the research is or has been conducted, should be directed to the University of Wollongong Human Research and Ethics Committee, Ethics officer on (02) 4221 4457.

This information sheet is for you to keep.

Researchers

Karley McKeowen
Faculty of Education
University of Wollongong
Ph: 0403 817 169
E: karleymc@uow.edu.au

Assoc Prof. Sue Bennett
Faculty of Education
University of Wollongong
Ph: 4221 5738
E: sbennett@uow.edu.au

Prof. Lori Lockyer
Faculty of Education
University of Wollongong
Ph: 4221 4657
E: llockyer@uow.edu.au

Appendix P: Student participant information sheet

University of Wollongong

STUDENT INFORMATION SHEET
Research Project
An investigation of students' practices and value of technologies at school and in everyday life

Dear Student,

I am trying to find out about how students use technology at school and in their everyday lives.

To do this I would like to come into your school to speak to you about how you use technology and what you think about how technology is used at your school.

While in your classroom I will ask you to fill in a questionnaire about how you use technology in your everyday life.

After this activity I would like ask some students from your class to participate in two short interviews and to keep a diary of all their technology use over two-weeks. In the interviews we will discuss how you use technology at school and in your everyday life, what you think is important and how technology is used at your school. Each interview will take about 30-40 minutes, so I will audio record your ideas to help me remember what you say. The technology diary will involve you making short notes of what, where, why, and who with you are using technologies throughout each day over two weeks. This research does not aim to uncover any illegal activity; therefore, you do not need to mention any illegal downloading or other illegal activities in the interviews or recorded in the technology diary.

You may choose to participate in just the questionnaire, or you may choose to participate the interviews and technology diary as well. You don't have to be a part of this study if you don't want to and not participating will not affect your relationship with the school or the University of Wollongong. If you do participate in the interviews and technology diary a $20 iTunes gift voucher will be given to you to show the researchers' appreciation for your participation.

I will not use your name when talking or writing about you what I learn from you.

You can tell your teacher or me at anytime if you change your mind about taking part in the study and we will stop collecting information about technology in your life and withdraw any information already collected.

Please talk to your parents or caregivers about this note.

If you would like to participate please fill out the consent form together and bring it back to your teacher.

Please ask me or your teacher if you have any questions.

Thank you
Karley McKeowen

Appendix Q: Parent/Caregiver participant information sheet

University of Wollongong

PARENT/CAREGIVER INFORMATION SHEET
Research Project
An investigation of students' practices and value of technologies at school and in everyday life

Your child is invited to take part in a study that is being conducted by Karley McKeowen. It is part of a Doctor of Philosophy study, being supervised by Associate Professor Sue Bennett and Professor Lori Lockyer at the University of Wollongong. We are asking you if it is okay for your child to take part in this project.

Purpose of the research
The purpose of the research is to better understand students' practices with and value of technologies in order to assist policy makers and educators to more effectively integrate technology into the curriculum in a meaningful, relevant and engaging manner. The information from the study will be used to provide valuable descriptions about students' experiences with technology and the factors that impact upon their technology use. Understanding these experiences will assist schools and educators in enhancing teaching and learning experiences in order to better develop young people as successful learners, creative individuals and informed 21st century citizens. We will report the results directly to the principal and teaching staff involved in the project. Academic and professional publications will also be developed to report the results to the broader research community.

Investigators

Karley McKeowen	Assoc Prof. Sue Bennett	Prof. Lori Lockyer
Faculty of Education	Faculty of Education	Faculty of Education
University of Wollongong	University of Wollongong	University of Wollongong
Ph: 0403 817 169	Ph: 4221 5738	Ph: 4221 4657
E: karleymc@uow.edu.au	E: sbennett@uow.edu.au	E: llockyer@uow.edu.au

Method and demands on participants
We will ask your child to complete a questionnaire in class, taking up to 20 minutes to complete. The questionnaire will provide the researcher with valuable information about their technology use at school and in everyday life, including family background information like parental occupations. Data from this questionnaire will provide valuable information to your child's school but will not reveal any identifying details about your child or family. In the second phase of the study three students from each class will be invited to participate in two 30-40 minute interviews conducted within school hours and will be asked to keep a technology diary detailing their technology use over a two-week period. We may invite your child to possibly participate in the interviews and technology diary.

Data collection will occur within the school during regular class time in Term 3, 2012. The research will involve your child being withdrawn from class for two 30-minute interviews that will be scheduled with the consultation between your child and their teachers to create minimal disruption to your child's regular classroom activities. Other research activities will not affect your child's regular school activities and the principal researcher who is an experienced classroom teacher will collect all data. If your child does participate in the interviews and technology diary a $20 iTunes gift voucher will be given to your child to show the researchers' appreciation for their participation.

Possible risks, inconveniences and discomforts

Participation is voluntary and your child will only take part if both you and your child agree. If you or your child changes their mind about taking part, even after the study has started, contact the researchers or the school and any information already collected about your child will be withdrawn and destroyed. If you decide not participate in the study no data will be collected from your child. If you do not wish for your child to participate please disregard this Information Sheet and the accompanying Consent Form. If you later decide to withdraw your child's participation in the study please contact one of the researchers (see contact details below). Non-participation will not affect you or your child's relationship with their school or the University of Wollongong.

You should also be aware that if your child takes part in this study the interviews will be audio recorded and later transcribed for accuracy. These recordings will be:

- Collected over two interviews
    a. The first interview to be conducted in Term 3 in week 6 or 7 during class time
    b. The second interview to be conducted in week 9 or 10 during class time
- Securely stored along with other data in the researchers office and held for a period of five years after which they will be destroyed.
- Digital recordings will only be accessible to the researchers and not be directly used in any publications or presentations.

Ethics review and complaints

Data collected about your child will be stored securely in the Faculty of Education for at least five years to conform to the University's Code of Practice-Research and the joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997) and then destroyed.

No one will be able to identify you or your child from the results of this study. Only the researchers will have access to this information, except when students are identified as being at risk from harm from themselves or others. In this case, the names of these students will be given to the school principal. As with any other class activity where students are discussing themselves and their families, there may be the potential for your child to reveal sensitive information. Should they reveal any sensitive information or criminal activity this information will be removed from data collection and mandatory school child protection procedures will be followed. This research does not aim to uncover any illegal activity; therefore we discourage your child from revealing any illegal downloading or other illegal activities during the collection of data.

If you would like to check that you are okay with the information or recordings from the study or if you do not agree to the recordings being made public after the study you should contact the research team or the school.

When you have read this information the chief researcher, Karley McKeowen, will be available to answer any questions you may have. If you would like to know more at any stage, please feel free to contact any of the researchers (see contact details below). Concerns or complaints regarding the way in which the research is or has been conducted, should be directed to the University of Wollongong Human Research and Ethics Committee, Ethics officer on (02) 4221 4457.

This information sheet is for you to keep. Your child has also been given information about this research project.

Appendix R: Teacher participant consent form

University of Wollongong

TEACHER CONSENT FORM
Research Project
An investigation of students' practices and value of technologies at school and in everyday life

I (print name) …………………. consent to participate in the research project described below.

TITLE OF THE PROJECT: An investigation of students' practices and value of technologies at school and in everyday life

CHIEF RESEARCHER: Karley McKeowen 0403 817 169 karleymc@uow.edu.au
CO-RESEARCHERS: A/Professor Sue Bennett 4221 5738 sbennett@uow.edu.au
Professor Lori Lockyer 4221 4657 llockyer@uow.edu.au

In giving my consent I acknowledge that:

1. The procedures required for the project and the time involved have been explained to me and any questions I have about the project have been answered to my satisfaction
2. I have read the Teacher Information Sheet and have been given the opportunity to discuss the information and my involvement in the project with the researchers
3. I understand that my participation in this project is voluntary; a decision not to participate will in no way affect the school and their relationship with the school and I am free to withdraw my participation at any time.
4. I understand that my involvement is strictly confidential and that no information about myself, my class or school will be used in any way that reveals any identities.
5. I understand that the data collected through my participation will be audio taped, analysed and reported anonymously in conference and journal publications and I consent for it to be used in that manner.
6. I understand that if I consent to participate in this project, I will be asked to:
   - Plan, with the researcher, a time schedule for data to be collected from my class
   - Allow the researcher to administer and collect student questionnaires
   - Participate in a 30-minute audio-recorded interview about technology use in my class and the school
   - Discuss with the researcher students that may be appropriate and willing to participate in the subsequent activities (i.e. two interviews and technology diary)
   - Allow the researcher to conduct scheduled, two audio recorded interviews with three selected students from my class
   - Allow the researcher to collect the completed technology diaries from the students
   - Assist the researcher to collect documents such as the school plan.

Signed …………………….. Name ……………………................. Date ……………………….

If you have any enquires at any stage, please feel free to contact any of the researchers according to the details provided on the Information Sheet. Concerns or complaints regarding the way in which the research is or has been conducted, should be directed to the University of Wollongong Human Research and Ethics Committee, Ethics officer on (02) 4221 4457.

Appendix S: Student participant consent form

University of Wollongong

STUDENT CONSENT FORM
Research Project
An investigation of students' practices and value of technologies at school and in everyday life

I have been told about the research project: *An investigation of students' practices and value of technologies at school and in everyday life* in class.

Please tick the boxes to show that you understand and agree to:

- ☐ I understand that the researcher will ask me to fill in a questionnaire about how I use technology.

- ☐ I understand that the researcher might ask me to participate in two audio-recorded interviews during which I will tell her about how I use technology and what I think about technology and how it is used at school.
  I also understand that the researcher might ask me to record all of my technology use each day in a technology diary that I will keep for two weeks.

I understand that I should not mention any information about possible illegal activity involving technology.

I understand that the researcher won't use my name when writing or talking about the project.

I understand that I don't have to be a part of this study, and if I decide at anytime not to be a part of it, I can change my mind.

If I have any questions I can ask the researcher, my teacher or the principal.

I agree to be part of this study.

Your name: ……………………………………………….

Your signature: ………………………………………….

Date: ……………………………

Appendix T: Parent/caregiver consent form

University of Wollongong

PARENT/CAREGIVER CONSENT FORM
Research Project
An investigation of students' practices and value of technologies at school and in everyday life

I (print name)……………………………...give consent to the participation of my child (print name)………………………… in the research project described below.

TITLE OF THE PROJECT: An investigation of students' practices and value of technologies at school and in everyday life

CHIEF RESEARCHER:	Karley McKeowen	0403 817 169	karleymc@uow.edu.au
CO-RESEARCHERS:	A/Professor Sue Bennett	4221 5738	sbennett@uow.edu.au
	Professor Lori Lockyer	4221 4657	llockyer@uow.edu.au

In giving my consent I acknowledge that:

1. The procedures required for the project and the time involved have been explained to me in the Information Sheet and any questions I have about the project have been answered to my satisfaction
2. I have read the Parent/Caregiver Information Sheet and have been given the opportunity to discuss the information and my child's involvement in the project with the researchers
3. I have discussed participation in the project with my child and my child assents to their participation in the project in the following activities (please tick):
   - ☐ Complete the questionnaire in class, providing information about their technology use at school and in everyday life
   - ☐ Participate in two 30-40 minute interviews conducted within school hours and will be asked to keep a technology diary detailing their technology use over a two-week period.
4. I understand that my child's participation in this project is voluntary; a decision not to participate will in no way affect their academic standing or relationship with the school and they are free to withdraw their participation at any time.
5. I understand that my child's involvement is strictly confidential and that no information about my child will be used in any way that reveals my child's identity.
6. I understand that if my child participates in the interviews audio recordings will be made as part of this study. These recordings will take place with selected students during:
   a. The first interview to be conducted at school, at a time and date negotiated with my child's teacher
   b. The second interview to be conducted at school, at a time and date negotiated with my child's teacher

Signed …………………… Name …………………….................. Date ………………………

If you have any enquires at any stage, please feel free to contact any of the researchers according to the details provided on the Information Sheet. Concerns or complaints regarding the way in which the research is or has been conducted, should be directed to the University of Wollongong Human Research and Ethics Committee, Ethics officer on (02) 4221 4457.

Appendix U: Occupation classification data

Statistical data from 2011 census (ABS, 2011)

	Managers	Professionals	Technicians and trade workers	Community and personal service workers	Clerical and administrative workers	Sales workers	Machinery operators and drivers	Labourers	Inadequately described/Not stated
Northern area	10.7	24	15.4	12.7	14.8	8.3	6.4	6.5	1.1
Southern area	6.8	10.1	17.8	12.2	12.3	11.6	12.1	15	2.1
Regional city	9.9	20.6	15.8	11.5	14.2	9.5	7.7	9.2	1.6
Australia	12.9	21.3	14.2	9.7	14.7	9.4	6.6	9.4	1.9

Student responses to item two in the study questionnaire

	Managers	Professionals	Technicians and trade workers	Community and personal service workers	Clerical and administrative workers	Sales workers	Machinery operators and drivers	Labourers	Inadequately described/Not stated
North High School	4.9	29.3	2.4	4.9	22	2.4	7.3	7.3	7.3
South High School	6.9	16.7	5.6	8.3	18.1	9.7	16.7	9.7	1.4

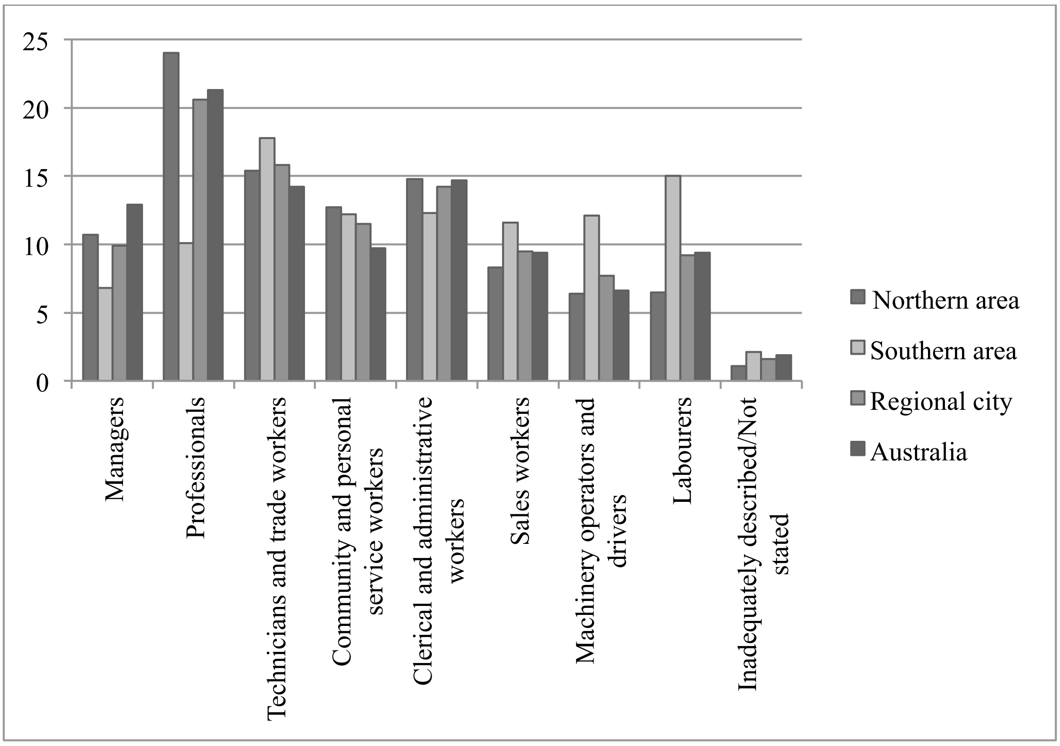

Figure Occupation classification data. Sourced from 2011 census data (ABS, 2011)

Appendix V: Letter of invitation to school principals

University of Wollongong

Research Project
An investigation of students' practices and value of technologies at school and in everyday life

Dear Principal,

My name is Karley McKeowen, and I am currently undertaking a Doctor of Philosophy research study within the Faculty of Education at the University of Wollongong. I would like to invite you and your school to take part in this study being supervised by Associate Professor Sue Bennett and Professor Lori Lockyer. The broad aim of the research project is to gain a better understanding high school students' use of technology at school and in everyday life and the value they place on these technologies in order to assist policy makers and educators to more effectively integrate technology into the curriculum in a meaningful, relevant and engaging manner.

The information from the study will be used to provide valuable descriptions about students' experiences with technology and the factors that impact upon their technology use. Understanding these experiences will assist schools and educators in enhancing teaching and learning experiences in order to better develop young people as successful learners, creative individuals and informed 21st century citizens. We will report the results directly to the principal and teaching staff involved in the project. Academic and professional publications will also be developed to report the results to the broader research community.

Specifically, we are seeking schools and teachers who are willing to assist with the following data collection activities with one Year 9 and one year 10 class during Term 2, 2012:

- The facilitation of a 20-minute questionnaire with each class asking questions in regards to their family background, access to and use of technology in everyday life
- Participate in a 30-minute one-on-one interview between the teacher and researcher about how technology is used in their classroom and the school
- Assist to schedule two 30-40 minute interviews with 3 students within their class about the students use of and value of technology at school and in everyday life
- Facilitate the collection of relevant school documents such as the school plan.

The research has been designed to have minimal impact upon the school, teaching staff and students. The principal researcher who is an experienced classroom teacher will conduct all data collection activities, the teacher's involvement in the study will be to assist with the time scheduling of these activities.

With your permission and the permission of the students in your class and their parents, we will ask your students to participate in the study. Students will be selected to participate in the interview based on their responses in the questionnaire and with your consultation. The interviews will involve participating students discussing their technology use and perspectives with the researcher. All interviews will be audio taped and later transcribed for accuracy. These students will also be asked by the researcher to keep a technology diary for two-weeks, however, this will be completed in the students own time. Data collection will occur within the school, the questionnaire in your classroom and interviews in a location within the school during Term 3, 2012.

If your school is interested in participating in this project the chief researcher will visit your school, at a time of your convenience, to discuss the project with your staff.

Your schools' participation in this study is voluntary and you may withdraw at anytime by contacting Karley McKeowen, or any of the researchers. If you decide not to take part, even after the study has started it will not affect your schools relationship with the University of Wollongong. Should you withdraw from the study, any data already collected will be destroyed.

Data collected from the study will remain confidential and be available only to the researchers. Data will be stored securely in the Faculty of Education for at least five years to conform to the University's Code of Practice-Research and the joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997) and then destroyed.

When you have read this information the chief researcher, Karley McKeowen, will be available to answer any questions you may have. If you would like to know more at any stage, please feel free to contact any of the researchers (see contact details below). Concerns or complaints regarding the way in which the research is or has been conducted, should be directed to the University of Wollongong Human Research and Ethics Committee, Ethics officer on (02) 4221 4457.

This information sheet is for you to keep.

Researchers

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Appendix W: Alignment of thematic and theoretical coding frameworks with the guiding theoretical constructs

Thematic code	*Theoretical code*	*Guiding theoretical construct*
Technology device	Resources available and accessible	Objectified field structures; Economic capital
Location or distribution of device in the home		Objectified field structures
	Position in the school field	Embodied field structures
	Position in various everyday life fields	
Rules about technology use at home		
Rules about technology use at school		
	Being attuned to the rules in certain fields	
School experiences with technology	Past and present experiences with/without technology	Habitus
Past experiences with technology		
Learning new technologies		
Thoughts about technology for learning	Disposition toward technology	
Self perception as a technology user		
Typing vs. pen and paper		
Technology as an interest		
Parents’ perceptions of technology	Own and others beliefs and perceptions about the perceived value of technologies	
Value of technologies		
Parents’ technology practices	Own and others’ beliefs and perceptions; Socialisation into technology practices	
Siblings’ technology practices		

Friends' technology practices	Socialisation into technology practices	Cultural objectified capital
Teachers' technology practices		
	Investing time into self improvement of technology skills	Cultural embodied capital
Technology elective at school		
	Networks of contacts and support	Social capital
	Potential for material or symbolic profits through using technologies	

Appendix X: Thematic and theoretical codes, definitions and coding examples from student interviews

Thematic code	*Theoretical code*	*Definition*	*Example coding*
Technology device	Resources available and accessible	Reference to an information or communication technology device.	iPod
Location or distribution of device in the home		The location of a technology device and its mobility influences how it is used. The distribution of technology resources influences persons' access to and use of the device.	It's [desktop] downstairs; it's kind of away from everything – it's down in my games room. It's just away from where we all live most of the time.
Position in the school field		The position, in relation to others', in a particular field based on technological skills, knowledge, interest, value and experience.	Well I had to get my mate to help me because he's good at computers. I just needed him to help me with a few little things like viruses and that…. Yes, just telling me what to do for next time, if it happens and that… A few other times I needed some help in science and that.

Position in various everyday life fields	The position, in relation to others', in a particular field based on technological skills, knowledge, interest, value and experience.	Because she didn't know how to do it, I did it for her so that way it was all set up and because my Nan and Pop aren't real confident with the computer they ask for help all the time.
Rules about technology use at home	Culture of technology use, including the rules placed on technology use in various fields.	Well they know that I'm on Facebook but they don't really have any rules. I used to when I was younger; they used to tell me "Twenty minutes and you're off" but now they just let me do whatever.
Rules about technology use at school	Culture of technology use, including the rules placed on technology at school.	I don't listen to music because I don't want to get caught and get in trouble and I don't play games because I'd rather just get my work done and not do it at home and also I don't have any games on the laptop computer

	Being attuned to the rules in certain fields	Whether the habitus and capital of the individual matches that of the field, thus understanding the rules of that particular field.	Yes and sometimes if we have free period or we're allowed to listen to music in class I use it then.
School experiences with technology	Past and present experiences with/without technology	Refers to present experiences with technology at school; including their own use of technology at school, teachers' use of technology for teaching and the absence of technology use.	…well I reckon it's used for finding information – that's why they have them so you can just type to find information and then you can keep all your books in one kind of… laptop.
Past experiences with technology		Refers to experiences students had with technology both at school and in everyday life, including when they first remember using technology up to their current high school education.	I kind of taught myself. … Yes, I remember clicking a lot of stuff trying to learn it because they don't really teach you how to use it.

Learning new technologies		Reference to experiences with unfamiliar technologies, acquiring or developing skills or knowledge associated with the use of a particular technology device or application	Most of the time you can just YouTube it and ask the question and someone will put it on YouTube.
Thoughts about technology for learning	Disposition toward technology	Refers to students' thoughts and perceptions about technology their technology use.	When I'm writing essays it's better to type them up because you can just delete stuff really quick and rewrite it but if it's questions out of a textbook or something I don't really learn from it – just typing up short little questions – I just forget… but with essays it gets stuck in your head more because you're constantly rewriting it.

Self perception as a technology user		Refers to comments and actions of students that express how they conceive themselves as a technology user.	I think it was kind of hard-wired into our brains because we're in the next generation; we're brought up with computers, we've been taught since we were very little.
Typing vs. pen and paper		Discussion of typing using a computer and/or writing using pen and paper.	On the computer it's all different documents everywhere and you have to sort it out and it gets too complicated; in the book it's just all together.
Technology as an interest		Acknowledges information and communication technology as a personal interest or hobby.	It's my favourite hobby – computers.
Parents' perceptions of technology	Own and others beliefs and perceptions about the perceived value of technologies	Includes anything a parent may say or do that provides evidence of their perceptions of technology.	I think I got an email address – because my parents knew it would be handy in the future.

Value of technologies		Comments or actions of students that provide evidence for their value of technologies for learning, socialising, leisure, future employment, etc.	Just the dependence of it like communication. Because we're brought up with technology it would seem practically impossible to connect with people without it.
Parents' technology practices	Own and others' beliefs and perceptions; Socialisation into technology practices	Student descriptions of parents' practices with technology, these may be observed or not.	She would probably just use it for banking and not really much else.
Siblings' technology practices		Student descriptions of siblings' practices with technology, these may be observed or not.	I would say probably my sisters would have a decent amount; they would probably go on their computers as well and they have iPods.
Friends' technology practices	Socialisation into technology practices	Student descriptions of friends' practices with technology, these may be observed or not.	Yes, a few of my friends are gamers but I play different games apart from them.
Teachers' technology practices		Student descriptions of teachers' practices with technology, these may be observed or not.	Yes, we just write whatever they ask us to write down and answer questions on there.

	Investing time into self improvement of technology skills	Reference to time spent learning skills and knowledge associated with information and communication technologies	I just sort of heard of it so I made an account and I just called someone to see what it was like…
Technology elective at school		Refers to a technology elective subject at school.	I was doing information software technology but that one got cancelled because there were no teachers teaching it so I'm stuck doing music now.
	Networks of contacts and support	Refers to networks of people (including online) that provide opportunities, advice, and support in relation to technology practices.	…if I go to my friend Stephanie's, she's probably the most technological friend I have and she's got all this technology.
	Potential for material or symbolic profits through using technologies	Refers to the potential benefits that may result through using technologies including status, skills, knowledge, etc.	Probably Twitter because you always know what's going on in the world like with trending topics and things and probably the internet itself – YouTube and everything because you can see everything like what's going on in the world again.