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ICT literacy and the digital divide: Understanding primary students' ICT practices and possibilities

Tiffani Louise Apps
University of Wollongong

UNIVERSITY OF WOLLONGONG

Faculty of Social Sciences
School of Education

ICT literacy and the digital divide: Understanding primary students' ICT practices and possibilities

Tiffani Louise Apps
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Declaration

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

Tiffani Louise Apps
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Candidate statement about the style of the thesis

This thesis is submitted as a "thesis by compilation". It includes four in-preparation journal manuscripts for future submission and four 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 selected peer-reviewed journals publish papers that promote knowledge sharing in the areas of educational technologies, digital literacies, curricula and social inclusion, and are aptly suited for the content of this thesis.

In a thesis by compilation format it is inevitable that there will be a degree of repetition resulting from the fact that some information has to be repeated to allow manuscripts to function as stand-alone pieces. In this thesis this occurs particularly in the explanations of the theoretical framework and the methodology of the study.

The thesis by compilation format was chosen for this research on the advice on 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 the close guidance of 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.

ABSTRACT

Despite popular assumptions that children of today possess high levels of skill and knowledge in the use of information communication technologies (ICT), results from large-scale assessments of ICT literacy indicate that young people's ICT literacy is generally low-level and is associated with factors such as socioeconomic status, geographical location and ethnicity. These patterns of digital inequality are commonly referred to as the digital divide, which is the difference between those who have, or have access to learning, the necessary ICT skills and competencies and those who do not. Addressing this digital divide is a global imperative, as individuals who do not develop ICT literacy will be limited in their economic, civic and social participation. This sentiment is reflected in Australian educational goals that indicate that the school context plays a significant role in the development of ICT literacy to ensure digital inclusion for all citizens.

To address the digital divide requires a deep understanding of the way children use ICT. Research that has investigated children's ICT practices has mostly been large-scale quantitative studies that have identified the significant role that economic, social and cultural capital has on children's ICT literacy achievement. The findings from these studies have shown that in general 'advantaged' families possess greater stocks of technological capital than 'disadvantaged' families. Beyond this binary view of the digital divide, a number of studies have begun to detail profiles of ICT experience to illustrate the nuances of individual ICT use and engagement. These studies have focused on the role of individual and contextual characteristics on ICT practices. Yet, what is not known is how and why differing home ICT experiences, including variations in economic, cultural and social capital, shape school-based ICT literacy. This study explored this gap in knowledge by investigating the home ICT experiences and school-based ICT literacy of students in their final year of primary school, highlighting their perspectives in exploring and explaining their ICT literacy.

A qualitative case study was conducted in one regional Australian primary school with 25 Year 6 students. The data collection strategy was integrated into regular lessons across one school term. Students completed a background questionnaire about their home ICT experiences and a digitally recorded ICT literacy task, and interviewed their

family members about their ICT use, which was reported in a class blog. Six students were purposively selected based on preliminary analysis to partake in a semi-structured reflective interview to discuss their ICT task performance whilst referring to their previous ICT experiences.

The theoretical lens used in this study was Bourdieu's theory of practice expressed as: [(habitus) (capital)] + field = practice. This theoretical construct guided the study and enabled the focus on the relationships and individual and contextual conditions that shape primary students ICT practices and possibilities.

The study's results indicate that students' ICT literacy was generally low-level. Patterns of ICT literacy emerged between professional and non-professional families, with students from professional families demonstrating stronger ICT literacy than their peers. The study's results also indicated that along with ICT literacy, students' ICT experiences varied, detailing different patterns of practice between family groups. However, further investigation revealed a number of family factors that shaped students' ICT literacy outside of these general patterns, including students' orientation towards ICT along with the transformative and restrictive role of parents and family rules.

The results of this study highlight two areas worthy of discussion: the construct of ICT literacy itself and ways in which students' ICT experiences shape their ICT literacy. This study considers ICT literacy to comprise six key processes, which are hierarchical and increase in complexity along the hierarchy. In addition, the findings indicate that ICT literacy is a social and cultural practice. Beyond a set of technical skills and knowledge, ICT literacy practices occur in a range of contexts for a variety purposes. The early experiences that primary school students have with ICT shape their ICT practices and possibilities. Specifically, this study found that ICT experiences that enabled school-based ICT literacy included students' positive orientation towards ICT use, exposure to a range of ICT practices and values for work and leisure, ICT in shared locations, which encouraged shared practices within the home, and access to skilled contacts within the family home who were equipped to guide and support family ICT practices.

Overall, the key findings from the study suggest that primary students' ICT literacy is varied and complex. Further, practices, dispositions and values that enable or constrain ICT literacy do not always match the typical binary view of the digital divide. This understanding can inform the design of more effective educational experiences that promote digital inclusion rather than unconsciously contributing to social divisions.

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CHAPTER ONE

Introduction

This traditional thesis chapter serves as an introduction to this thesis by compilation. The chapter provides an overview of the research context within which the study is situated. This is followed by details of the study's purpose and research questions, along with the significance of the research. The chapter then gives a brief outline of the research design and limitations, followed by detailed definitions of the key terms used in this study and details of the thesis by compilation structure.

1 Introduction

In the current worldwide educational climate, much significance is placed on the role of information communication technologies (ICT) in schooling to foster ICT literacy skills and competencies. In Australia this is evidenced in several policy documents over a decade old, such as the Adelaide Declaration (a policy document that details the commitment of State, Territory and Commonwealth Ministers of Education to improving Australian schooling), which states: “when students leave school they *should* be confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society” (Australia. Department of Education, Training and Youth Affairs [DETYA], 2000, p. 41, emphasis added). This was followed by the Melbourne Declaration, which built on the ideas of the previous document to indicate that “in this digital age young people *need* to be highly skilled in the use of ICT” (Ministerial Council on Education, Employment, Training and Youth Affairs [MCEETYA], 2008, p. 9, emphasis added). These aspirations have been explicitly enacted within the new Australian Curriculum through the inclusion of a cross-curriculum ICT General Capability and stand-alone Digital Technologies learning area (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2014, 2013). Despite a proactive vision of building ICT literacy skills and competencies, recent empirical evidence suggests that school students are far from being the confident, creative and productive users of new technologies first envisaged over 15 years ago.

Instead, the ICT literacy of children and young people is, in general, low-level and diverse. Interestingly, large-scale assessments of school students’ ICT achievement, both in Australia and internationally, have drawn attention to significant patterns of ICT literacy associated with the available economic, social and cultural capital of young people and their families (ACARA, 2012b; MCEECDYA, 2010; MCEETYA, 2007; OECD, 2010). These patterns of ICT literacy show a range of digital inequalities that are commonly referred to as the ‘digital divide’ (OECD, 2010). This divide extends beyond differences in physical access to digital technology, to encompass differences between those who have, or have access to learn, necessary ICT skills and competencies and those who do not (OECD, 2010). Whilst such an understanding of this digital divide

draws attention to the disparities in effective access to ICT skills and competencies between groups of people, what is not clear is how and why such differences occur.

The purpose of this study was to gain a deeper understanding of the "digital divide" by examining the ways in which differences in primary school students' ICT experiences at home shape their school-based ICT literacy practices. Specifically, the aim of this study was to:

- explore students' ICT literacy by employing Bourdieu's theory of practice (Bourdieu, 1977) to uncover factors that shape ICT literacy practices and possibilities; and
- better understand the perspectives of students in exploring and explaining their own ICT literacy practices.

This deeper understanding of students' ICT literacy practices will enable a better appreciation of their ICT literacy possibilities that will ultimately inform the design of pedagogies to promote digital inclusion rather than reinforce existing inequalities.

The background to the investigation, the research design and the questions guiding the inquiry are provided below. Details of this study's significance and limitations follow, and the chapter concludes by providing an overview of the structure of this thesis.

2 Background

Definitions of digital literacy are unequivocal and generally fall into two main categories: conceptual definitions and standardized operationalisations. The latter focuses on operationalising what is involved in being digitally literate in terms of certain tasks, performances and demonstrations of skills. For example, searching efficiently, comparing a range of sources, and sorting authoritative from non-authoritative, and relevant from irrelevant, documents (Lankshear & Knobel, 2015; Livingstone et al., 2005). In educational contexts operationalisations of digital or ICT literacy have extended beyond a focus on skills and knowledge to include context and reflect cognitive complexity. For example, the framework and assessments for measuring ICT literacy as part of the Program for International Student Assessment (PISA) is based on the view that mastery of technology alone does not constitute ICT literacy (International ICT Literacy Panel [IICTLP], 2007). In order to perform an ICT

task, a person must apply both cognitive skills (reading and problem-solving) and technical skills (accessing information on the Internet using a search engine).

Alternatively, research exploring conceptual understandings and theorisation of ICT literacy critiques operationalisations of digital or ICT literacy as too simplistic. Focusing solely on skills and measurement sidelines the myriad of social practices that individuals engage with when interacting with ICT (Buckingham, 2008). Instead, this body of work acknowledges the rich contextual practices of individuals when engaging with ICT to understand 'digital literacy' as a social and cultural practice (Buckingham 2010; Koltay, 2011; Livingstone & Helsper, 2008; Livingstone, Haddon, Vincent, Mascheroni, and Ólafsson, 2014; OECD, 2015)

The definition of ICT literacy adopted in an Australian school context and drawn upon in this thesis extends the *International ICT Literacy Panel* framework to operationalise ICT literacy as six processes, defined as individuals' ability to access information, manage information, evaluate information, develop new understandings, communicate with others, and use ICT appropriately to participate effectively in society (MCEETYA, 2007). From this definition a conception of student progress in ICT literacy was devised in terms of three strands: working with information; creating and sharing information; and using ICT responsibly (MCEETYA, 2007, p. 13). Such a definition highlights a number of complex cognitive processes associated with ICT literacy, going beyond technical mastery. Notions such as *evaluate information, develop new understandings* and *communicate with others* are far from basic technical skills, instead requiring students to engage in critical cognitive skills and higher order thinking. For example, using the Internet requires children to learn how to locate and select material by using browsers, hyperlinks and search engines (*working with information*). Yet, beyond basic technical skills, children also need to be able to evaluate and use information critically if they are to transform it into knowledge (*creating and sharing information*) (Buckingham, 2008). This definition of ICT literacy was selected as most appropriate for this study because the research is concerned with understanding a measure of school-based ICT literacy, skills and knowledge, together with an exploration of students' home ICT experiences to uncover factors that shape ICT literacy practice and possibilities.

Evidence from large-scale studies conducted over the last 10 years show that school students are generally achieving low levels of ICT literacy. A closer examination of these results reveals patterns of ICT achievement associated with a range of social and cultural factors (ACARA, 2012b; MCEECDYA, 2010; MCEETYA, 2007; Livingstone et al, 2014; PISA, 2015). While Australian data highlights a marginal increase in primary and secondary students' ICT achievement, overall, students' ICT literacy has remained generally low-level (Fraillon, 2012). This is reflected in stronger scores when students complete *working with information* tasks compared with lower performance across *creating and sharing information* tasks (ACARA, 2012b; MCEECDYA, 2010; MCEETYA, 2007). These results suggest that while students are generally competent with the basic skills required to work with information, this expertise does not translate to the higher order processes of ICT literacy required to create and share information. Furthermore, significant patterns of ICT literacy related to family background, education, location and indigenous status have remained constant, highlighting the complexity of ICT literacy practices (Fraillon, 2012). These patterns of ICT literacy are commonly referred to as the digital divide, which describes inequalities between groups of students in access to, use of or knowledge of ICT (Büchi, Just, & Latzer, M, 2015; Hargatti, 2010; Livingstone & Helsper, 2007; Norris, 2001; OECD, 2010 & 2015).

The persistence of the digital divide raises important questions about current educational practice at a school and classroom level, including why such inequalities exist and why ICT learning gains are not greater given the significance placed on the development of ICT literacy. Research exploring factors that contribute to the digital divide in a school context draws attention to a number of factors influencing young people's access, knowledge and use of ICT including material resources, gender, location and family background, as indicated by parental occupation, education and income (Gibson, 2003; Robinson, 2014b; Smith, Skrbis, & Western, 2013; Yelland & Neal, 2013). However, what these studies have not shown is how such factors influence ICT literacy. Qualitative research exploring digital inequalities in relation to family background suggests that differences in ICT preferences and knowledge are reflective of broader processes of social reproduction (Smith et al., 2013; Samuelsson, 2012). These findings suggest a binary digital divide between advantaged and disadvantaged groups.

Recent studies exploring the digital divide have begun to profile students' ICT experiences and uses, moving away from a binary view as simply advantaged versus disadvantaged. These studies detail the complexity of young people's ICT practices and draw attention to individual factors such as preferences and motivation, along with a variety of contextual characteristics including gender, home access, networks of support, confidence and school use that can work to enable or constrain ICT literacy practices and possibilities (Eynon & Malmberg, 2011; Eynon & Malmberg, 2012; Robinson, 2014a; Robinson & Schulz, 2013). Such findings are important, as they move beyond a binary view of the 'digital divide' to highlight the complexity of digital inequalities.

Addressing digital inequalities is of great significance for educators because ICT is an integral part of life in modern society. Students who do not develop ICT literacy are likely to be limited in their participation in economic and social life (MCEETYA, 2007). The emerging body of research has provided a general picture about students' ICT literacy practices and achievement, and acknowledges the influence of family background, orientation towards ICT and access to support and resources. Collectively, such an understanding of students' ICT practices has begun to draw attention to the complex sociocultural nature of ICT literacy. As yet, however, there is little known about how the type of ICT experiences and related resources that students accumulate at home influences their school-based ICT literacy.

Bourdieu's theory of practice is a useful lens for analysing the complex 'life worlds' of individuals through empirical investigations (Bourdieu & Wacquant, 1992). The application of his theoretical constructs has made significant contributions to understanding the role that schools and school systems play in reproducing social and cultural inequalities whilst legitimising certain cultural practices (Mills & Gale, 2007). Put simply, for many students the fields of the school and their classroom operate on a different set of stakes, power relations, resources and struggles than the field of their home, as school often assumes dominant middle class culture, values and attitudes in its students, this difference is greater for some students than others. Bourdieu offers a way of empirically understanding not just what schools do to students, but how they do it by recognising how objective relations become embodied in students through the discourse

and everyday practice of schools (Webb et al., 2004). This understanding can assist schools, policy makers and teachers to better use their capacity to confer capital, consciously drawing upon students' existing stock of cultural capitals to act as agents for change.

Accordingly, educational researchers have employed Bourdieu's theory of practice to explain school aged students' practice with ICT (Cranmer, 2006; Hollingworth, Mansaray, Allen, & Rose, 2011; North, Snyder and Bulfin, 2008). This work emphasises the inequalities and complexities of young people's ICT practices, as well as highlighting the potential of a Bourdieuian lens to understand how and why such patterns occur while critically evaluating the role of education and technology in their production.

Building on such research this study employed the theory of practice to examine the ways in which primary students' home ICT experiences shape their school-based ICT literacy practices. More specifically, the theory describes practice as a result of the relations between an individual's disposition (habitus) and position in a field (capital), and the current state of play of that social arena (field) (see Chapter Three for details). This theoretical lens was embedded in the study design and provided the researcher with a way of thinking that looks beyond what ICT practices young people are engaging in, to consider *how* and *why* these practices occur and, importantly, how they contribute to digital inequality. It is in this context that the study in this thesis was developed (Section 4.2 provides a detailed explanation).

3 Purpose and research questions

The purpose of this study was to better understand the 'digital divide' by paying attention to the ways in which differences in primary school students' ICT experiences at home shape their school-based ICT literacy practices. The study focused specifically on school-based ICT literacy rather than adopting a broader definition because school-based definitions reflect the components of ICT literacy that are valued in formal education and the criteria against which students are evaluated to judge their level of ICT proficiency. This focus does not assume that these are the only aspects of ICT literacy that exist or are valuable. Rather, the focus was chosen to particularly explore

the relationship between primary school students' ICT experiences at home and ICT literacy as measured in school.

The study was guided by a broad research question: How do primary school students' ICT experiences shape their school-based ICT literacy? From this central question, three sub-questions were developed. Each sub-question addresses one aspect of the overarching research question. These sub-questions reflect a refinement of the scope of the study to focus particularly on Year 6 primary students. Year 6 is the final year of primary school in New South Wales, Australia, where this study was set. Year 6 was chosen as this cohort is one of the focus groups in the Australian National Assessment of ICT literacy.

Question 1: How do Year 6 primary school students perform in terms of their school-based ICT literacy practices?

This question was concerned with how students in their final year of primary school performed on a task similar to those used to test ICT literacy as defined for Australian schooling. This involved obtaining a measure of students' ICT literacy by analysing artefacts students created and digitally recording their ICT literacy task, then using these digital recordings in reflective interviews. This data was used to better understand students' ICT literacy across the six processes examined in this study.

Question 2: How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?

This question was concerned with employing Bourdieu's theory of practice (1977) to characterise primary students' ICT experiences in order to uncover factors that shape ICT practice and possibilities. To do so, the line of inquiry, first, focused on students' preferences and practices to reveal underlying characteristics contributing to 'individual and group habitus' (Bourdieu, 1984). This was followed by a focus on the objective conditions of students' home fields including the culture of technology use and their available 'technological capital' (Selwyn, 2004), including economic, social and cultural resources.

Question 3: What is the relationship between a Year 6 primary school student's family background and their ICT literacy practices?

This question was concerned with developing a more sophisticated understanding of how patterns in students' school-based ICT literacy could be related to their family backgrounds (particularly their home ICT experiences). This line of inquiry was a major focus in the design of this study, with the aim of uncovering details about *how* and *why* differences in students' ICT literacy are manifested and perpetuated, regardless of the current ICT focused educational agenda.

4 Significance

This study makes a significant contribution to the research focused on the digital divide and young people's ICT literacy by seeking to understand the ways in which primary school students' home ICT experiences shape their school-based ICT literacy. This is a new and important area of investigation, particularly in an Australian context, with consistent patterns of ICT literacy achievement associated with socioeconomic status captured over the last 15 years (ACARA, 2012b). Given that Australia's national goals for schooling assert that schooling should be socially just, it is imperative that consideration be given about how to best reduce this achievement gap (MCEETYA, 2008). A detailed understanding of the ICT skills and knowledge that learners bring to the classroom and the ways in which such skills and knowledge can support or hinder school-based ICT literacy may provide a means to better cater for students' educational needs. Furthermore, this understanding is crucial to address well-documented patterns of ICT literacy achievement associated with socioeconomic status in Australian school students to ensure that *all* young people have the opportunity to develop into active participants in knowledge, society and economy, instead of compounding disadvantage.

This study extends previous investigations of school-aged students' ICT literacy (ACARA, 2012b) and conceptual work exploring the complexities of digital inequality (Helsper, 2008; Selwyn 2004; Servon, 2008; Warschauer, 2002) by employing Bourdieu's theory of practice to provide in-depth analysis of students' family backgrounds, experiences, practices and school-based ICT literacy. The empirical application of Bourdieu's theory of practice makes a novel theoretical contribution to research in the field of educational technology, by examining the variations in primary

students' school-based ICT literacy in relation to their habitus, technological capital and home fields. This is a new area of empirical work, as the existing body of research that employs Bourdieu's constructs to understand ICT practices has not focused on specific measures of school-based ICT literacy performance. Thus, the results from this study provide a rich understanding of the 'digital divide' by uncovering the experiences, individual characteristics and conditions that contribute to differences in ICT literacy achievement.

Theoretically, the empirical application of Bourdieu's constructs allows for comparisons to be made from this small case study to other contexts. Specifically, the application of the theory of practice to primary students' ICT practices allows for the further conceptualisation of each construct, within a technology specific context, to develop the framework for future research investigating ICT practices. This application shows the potential of a Bourdieuian framework for further investigations of ICT literacy practices, as well as providing rich details of the types of experiences that enable ICT literacy that may better inform the design of more effective educational experiences.

The study also makes a methodological contribution by demonstrating the use of digital recordings of a school-based ICT literacy task as a prompt for student reflection. This was a central component of the data collection strategy that extends understanding of students' ICT practices by capturing the processes used for further analysis and eliciting students' perspectives as a stimulus for reflective interviews. This allowed analysis of both the product and process of the task, and provided students with an opportunity to contextualise these outcomes within their broader ICT experiences. While studies have investigated school-aged learners' ICT experiences, skills *or* achievement (e.g. Beckman, Bennett, & Lockyer, 2014; Bulfin & North, 2007; van Deursen, Görzig, van Delzen, Perik, & Stegeman, 2014), this study's research design is significant because it explores experiences *and* school-based ICT literacy, to understand *how* and *why* primary school students' ICT experiences at home have shaped their school-based ICT literacy.

5 Research design

A qualitative case study approach was used to investigate the ICT literacy skills of primary students to understand variations in ICT literacy in relation to differing family backgrounds. This qualitative study used a case study design selected for the purpose of providing 'thick description' (Yin, 1994). The case study approach permits the study of context; this is a key factor in this research design, as it has bearing on how students understand and engage with technology. A single embedded case method was used to investigate primary aged students' ICT literacy together with details of their home experiences and practices.

There were 25 participants in this study. They came from one senior primary class (Year 6) of 28 students (aged between 11 and 13 years) in a regional public school in New South Wales. Year 6 students were targeted for this study, as they are also sampled in Australia's National Assessment Program for ICT. Specifically, a Year 6 class within a local primary school was purposively selected as the case for this study due to the mix of family backgrounds within the school and the researcher's working relationship with the school. The school's Index of Community Socio-Educational Advantage (ICSEA) value was 1,010, 10 points above the average Australian value of 1,000 (ACARA, 2010). However, a noteworthy characteristic of this school community was the diversity of student backgrounds. For example, the number of students from the bottom quarter of disadvantaged backgrounds was 5% higher than the Australian average distribution (ACARA, 2010).

Data was collected in three phases that were integrated into the case class' regular program. In Phase 1 all students in the class completed a questionnaire about their home ICT experiences as well as parent occupation data, and an ICT literacy task designed specifically for this study, which was digitally recorded using screen capture software. In Phase 2, six embedded participants were selected from the class to participate in semi-structured interviews for which they reflected on the ICT task while they watched the recording of their processes during the task, and also explained their actions with reference to their prior ICT experiences. Phase 2 participants were selected from the case class based on their participation in the ICT task to represent variation in ICT task performance based on preliminary analysis of Phase 1 results, with three high-

performing, two mid-performing and one low-performing students. In Phase 3 all students in the class conducted interviews with their families about their technology use and views. Students recorded responses in an interview proforma, which they then added to a class blog during allocated class time. The phases of this study were not intended as an intervention but as a means of measurement that allowed for multiple sources of evidence with the least possible disruption to student and teacher in an authentic environment. For example, the content of the ICT literacy task was designed to be integrated into the class unit of work on governments.

Data from the questionnaire, ICT literacy task, interviews and blog entries were each thematically coded, and then coded according to Bourdieu's theory of practice or the processes of ICT that comprise the definition of ICT literacy adopted by this study (MCEETYA, 2007). In terms of family background, questionnaire responses were first examined using the single level indicator of parental occupation. Occupations of students' parents were initially classified according to the Australian Standard Classification of Occupations (ASCO) schema (Castles, 1986). The single level indicator of highest status occupation within the home based on ASCO was used to determine occupation categories and broader socioeconomic background groups separated by professional occupations and non-professional occupations. These two groups allowed comparisons between family groups to be made. Coding reports for each data source were then compiled. Next, data sources were triangulated to create technology profiles. Technology profiles were first created for the whole class by converging questionnaire and ICT literacy task data, which allowed analysis of ICT literacy task performance, based on parental occupation groups. This was followed by the inclusion of interview and blog data for the study's six embedded participants, allowing for contextual analysis of each participant's school-based ICT literacy. The creation of technology profiles assisted in the confirmation of emerging findings and revealed a deeper understanding of participants' school-based ICT literacy in the context of their ICT experiences.

6 Limitations

The qualitative case study design provides an opportunity for the detailed exploration of students' ICT literacy, paying attention to factors shaping ICT literacy through a

Bourdieuian lens. However, there are a number of limitations associated with the method, including the inability to generalise from the findings and the influence of the researcher's own subjectivity. The intention is not to overcome these limitations, but to acknowledge them and address them in ways that enhance the quality of the study.

The case study design was chosen due to the exploratory nature of this research, as it affords the ability to provide thick contextual description. However, the findings present a detailed description of one particular case and are unlikely to be replicated in another context. For example, this study included a specific group of participants located in a particular school, and adopted a definition of school-based ICT literacy relevant to the context. It is therefore acknowledged that this study serves to further an understanding about how students' backgrounds come to influence their ICT literacy, but does not provide the basis for generalisations about all primary school students. The burden of generalisability 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).

The limitations of the empirical application of Bourdieu's theoretical constructs must also be acknowledged. The theory of practice has received criticism for its deterministic nature, suggesting the sociological framework only serves to illustrate social reproduction leaving little room for agency in understanding the practices of individuals and groups of individuals (Jenkins, 2002). These criticisms were considered throughout the period of study challenging the researcher's understanding. The research findings together with the researcher's engagement with an alternate body of sociological literature and research exploring young people's ICT practices (Eynon & Malmberg, 2011, 2012 Giroux, 2003; Harker & May, 1993; Hollingworth et al, 2011; Mills, 2008; North, Snyder & Bulfin, 2008; Reay, 2004; Robinson, 2014a, 2014b) allowed the researcher to resolve this conflict and draw attention to the transformative potential of the framework for understanding children and young people's ICT practices. A discussion of this process and the transformative potential of the framework is detailed in Chapter Eight. It is important to note that while the researcher engaged with sociological literature focused on the application of the theory of practice to adults ICT practices the differences between adults and children in relation to field and autonomy were considered and a focus on research with children and young people selected as most appropriate for this PhD study.

Additionally, the role of the researcher could be considered a limitation of this type of study design, as there is no neutral way to represent the physical or social world (Mills & Gale, 2007). In such studies, epistemic reflexivity allows researchers to conduct, analyse and present the research findings accounting for their values, beliefs, knowledge and biases while paying attention to the researcher's own position in the field (Deer, 2012). This was achieved in this study by acknowledging three types of researcher bias in a methodical exploration of the "unthought categories of thought which delimit the thinkable and predetermine the thought" (Bourdieu as cited in Wacquant, 1992, p.40). This activity, undertaken to enhance the credibility of the findings, is detailed in Chapter Three.

7 Definitions used in this study

In the context of this study the following terms have been used. A critical discussion of the theoretical and conceptual framework used in this study is detailed in Chapter 3.

ICT	'Information and communication technologies' (ICT) refers to a range of digital technologies including but not limited to computers, Internet, digital devices and software.
ICT literacy	ICT literacy is defined as the ability of individuals to use ICT appropriately to access, manage, integrate and evaluate information, develop new understandings and communicate with others to participate effectively in society (MCEETYA, 2007). This definition is derived from Australian policy documents and was selected as the most relevant for defining school-based ICT literacy for the context of the study.
Digital divide	The 'digital divide' refers to a gap in ICT use and achievement based on a range factors, although most commonly associated with socioeconomic background. The term 'digital divide' was originally used to highlight differences in access to computer equipment between rich and poor. As computers have become

	more affordable, the meaning of the term has been refined to focus on effective access, which expands the definition of access to include the impact of available resources and supports on the way individuals effectively access ICT. The revised definition of digital divide was originally termed the 'second digital divide' (OECD, 2010), but as this newer meaning is now commonly accepted, it is referred to as 'digital divide' in this thesis.
Digital inequalities	Similarly to the 'digital divide', the term 'digital inequalities' refers to differences in ICT use and proficiency; however, the term 'digital inequalities' deals with complexities of digital inclusion and exclusion instead of the simple binary division implied by the divide. As such, 'digital inequality' moves the focus from gaps to be overcome to social development that pays attention to the physical, digital, human and social resources that meaningful access to ICT entails (Warschauer, 2003).
Theory of practice	'[(habitus) (capital)] + field = practice' (Bourdieu, 1984, p. 101). This set of relations can be described as: practice, referring to an individuals actions and behaviour, resulting from relations between one's dispositions (habitus) and one's position in a field (capital), within the current state of play of that social arena (field) (Maton, 2008).
Habitus	For Bourdieu, it is habitus that orients an individual to act (Bourdieu, 1977). In relation to technology practice, habitus can be described as practices and personal dispositions or inclination toward the use of technology. Habitus is both structured and generative: structured by an individual's past and present circumstances, and generative as it works to shape present and future practices (Maton, 2008). Therefore, young

people use technology according to what fits their habitus (Bourdieu, 1991). Although habitus cannot be directly observed in empirical research, it can be 'apprehended interpretively' (Reay, 2004, p. 439). Bourdieu himself demonstrated this through his own research study *Distinction*, with a qualitative focus on preferences and practices to interpret the underlying characteristics that contribute to an individual and group habitus (Bourdieu, 1984). This study focuses on students' technology practices and preferences in an attempt to understand individual and collective student habitus, including likes, time spent, purpose, motivation and confidence, to capture a glimpse of habitus and the ways in which it structures technology practice both individually and collectively.

Field	Fields, according to Bourdieu, are networks of social relations, structured systems of social position within which manoeuvres take place over resources, stakes and access (Everett, 2002, p. 60). In relation to technology practice, the objective conditions of a field can then be understood as structured systems of social relations objectively shaping students' engagement with and use of technologies. In this study field refers specifically to the objective conditions of a student's home environment, including resources available, culture of technology contacts, uses, rules surrounding use and positions of family members in regard to technology use.
Capital	Capital acts as a social relation; the term is extended to all goods, material and symbolic, without distinction, that are rare and worthy of being sought after in a particular social form (Webb, Schirato, & Danaher, 2002). This study focuses on three forms of capital: economic, social and cultural.

Economic capital	Economic capital is immediately and directly convertible into money and may be institutionalised in the form of property rights (Bourdieu, 1986, p.47). Forms of economic capital relevant to this study include material resourcing of students' home environments including quality and quantity of equipment and capacity for its maintenance and upgrade (Selwyn, 2004).
Social capital	Social capital consists of social obligations ('connections'), which are convertible, in certain conditions, into economic capital and may be institutionalised in the form of a title of nobility (Bourdieu, 1986, p.47). In this study social capital refers to a student's networks of 'technological contacts' and support (Selwyn, 2004).
Cultural capital	Cultural capital can be considered in three forms: embodied (in the form of knowledge or propensities), objectified (materially represented in the form of books, paintings, instruments and other artefacts) and institutionalised (in the form of educational qualifications) (Bourdieu, 1986; Moore, 2012). Forms of cultural capital relevant to this study include embodied (self-interest in investing time into self-improvement of ICT skills and active participation in ICT education), objectified (socialisation into technology use and 'techno-culture' via techno-cultural goods, family, peers and others) and institutionalised (formal school ICT learning) (Selwyn, 2004).
Technological capital	Technological capital is an extension or subset of Bourdieu's different forms of capital (Bourdieu, 1997; Bourdieu & Passeron, 1977), conceptualised by Selwyn (2004) to highlight the different resources that structure an individual's ICT practices. This study examined students' accumulation of

	technological capital to discover how technology experiences are structured.
Doxa (doxic practices)	The silent culture or unquestioned shared beliefs associated with a field. For example, ICT is a tool for leisure activities. Through constant exposure to doxic practices, individuals come to accept them as natural and legitimate (Webb et al., 2002; Deer 2012).
Bourdieuian lens	Refers to the theoretical framing of this study, Bourdieu's theory of practice.

8 Structure of the thesis

This research is reported in the 'thesis by compilation' format and is presented as a combination of conventional thesis chapters and chapters that are written in the form of in-preparation (that is, yet to be published) journal article manuscripts. The purpose of presenting a thesis in this format is to afford the doctoral candidate the opportunity to develop the 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.

This thesis by compilation comprises four traditional thesis chapters and four in-preparation journal manuscripts. A signed declaration of contribution for each co-authored manuscript is provided in Appendix A. Table 1 gives an overview of the chapters, and is followed by a brief summary detailing the focus of each chapter.

Table 1. Thesis by compilation chapter overview

Chapter	Title	Format	Authorship of manuscripts	Target journal
1. Introduction	Introduction	Thesis chapter	n/a	n/a
2. Literature Review	ICT literacy and the digital divide: A systematic review of the research investigating school students' ICT literacy and associated practices.	Manuscript prepared for submission	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)	Educational Research Review *JCR 2014 Impact Factor = 2.452; ranked 11/224 (Education & Educational Research)*
3. Method	Methodology	Thesis chapter	n/a	n/a
4. Results	Technology in my life: Understanding differences in primary students' ICT experiences	Manuscript prepared for submission	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)	Learning, Media and Technology *JCR 2014 Impact Factor = 0.759; ranked: 107/224 (Education & Educational Research)*
5. Results	Capturing primary students' ICT literacy: A school based assessment	Manuscript prepared for submission	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)	Australian Journal of Education *JCR 2014 Impact Factor = 0.216; ranked: 209/224 (Education & Educational Research)*
6. Results	"Well, not all kids are experts with technology": Primary school students' explanations of their ICT literacy practices	Manuscript prepared for submission	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)	Computers and Education *JCR 2014 Impact Factor = 2.556; ranked 8/224 (Education & Educational Research*
7. Results	Maybe it's the environment we grow up in: Understanding primary students' ICT practices through a Bourdieuian lens.	Thesis chapter	n/a	n/a
8. Conclusion	Conclusion	Thesis chapter	n/a	n/a

Chapter Two presents a systematic review of the literature that investigates school students' ICT literacy and associated practices. A systematic approach to the literature review was chosen as it provides a robust, reproducible method to identify, select and appraise all studies that are relevant to the literature review questions this study poses.

Such a method was chosen as it provides scientific approach rather than a subjective appraisal of part of the whole truth (Booth, Papaioannou, & Sutton, 2012). Literature was retrieved across three focus areas: students' ICT literacy, the digital divide and students' technology practices explored through Bourdieu's theory of practice. Inclusion criteria were applied during an initial review, followed by analysis of remaining papers to produce summaries and identify major themes for each review question. In the context of this thesis this systematic review makes the following contributions: it explains the background to the study by reviewing related empirical research; provides a rationale for this study's methodological approach and theoretical framework; and identifies the research gap whereby this study addresses. This in-preparation manuscript has been prepared for *Educational Research Review* because it is a highly ranked journal that is focused on publishing systematic literature reviews on similar topics.

Chapter Three is prepared as a traditional methodology chapter, detailing the research questions, study design, theoretical framework, participants and site, data collection procedures, data analysis strategies and verification methods. A traditional methodology is provided in this thesis by compilation to provide a detailed methodological and theoretical description that situates the results papers within the whole study.

Chapter Four presents findings about students' home ICT experiences. The purpose of this paper is to provide background data about students' family ICT experiences, including ICT resources, family ICT practices, values and demographics. Drawing on questionnaire data from Phase 1 of this study, the paper details the ways in which the participants and their families accessed and engaged with ICTs during the course of a regular week. Analysis of this data used the theory of practice as a conceptual framework and ASCO occupation categories as a measure of socioeconomic status (Castles, 1986). This allowed for a detailed exploration of students' ICT backgrounds to develop a more sophisticated understanding of their ICT use and engagement. As part of the thesis, this chapter reports baseline data about the whole-class case, and helps to answer Research Question 2, "How can the ICT experiences of Year 6 primary students be characterised in terms of Bourdieu's theory of practice?" As a stand-alone paper, it adds to the literature by highlighting the type of dispositions, family practices and technological capital that may enable or constrain effective access to ICT, and offers

suggestions for how educators and schools can tailor learning experiences to promote digital inclusion. This paper has been prepared as a journal manuscript for submission to *Learning Media & Technology*. This journal was selected as it publishes research that builds on contemporary debates including the social, cultural, economic and political nature of educational media and technology. The paper is suited to the journal as it takes a critical approach to understanding the ICT practices of primary students in the social, cultural and economic context of their home fields while considering the impact of the broader social positioning of their families.

Chapter Five presents the findings from a school-based ICT literacy task that was completed by 22 Year 6 students. This paper draws on ICT literacy task and questionnaire data from Phase 1 of this study to provide details of students' ICT literacy in the context of their family background. The purpose of this paper was to provide details of students' actual ICT literacy, rather than relying on self reported data and self-efficacy ratings commonly evidenced in literature. The ICT literacy task was scored using digitally captured screen recordings and student artefacts. Student results were compared across sub-tasks to identify areas of strength and weakness in terms of the six processes of ICT literacy, drawn from the definition of school-based ICT literacy adopted for this study (MCEETYA, 2007). Results were then analysed in relation to students' family backgrounds. As part of the thesis, this chapter provides in-depth detail of students' school-based ICT literacy for the whole class case, and helps to answer Research Question 1, "How do Year 6 primary school students perform in terms of their school-based ICT literacy practices?" As a stand-alone paper, it adds to the literature by providing rich and detailed descriptions of Year 6 students' ICT literacy, including both processes and product, as well as examining the influence of family backgrounds in contributing to digital inequalities. The paper has been prepared as a journal manuscript for submission to the *Australian Journal of Education*, which publishes research conducted in Australia to inform educators and educational researchers about issues of contemporary concern in education. Given that the focus of this paper is capturing a measure of school-based ICT literacy using a definition specific to Australian school education, the findings are most relevant to Australian researchers and educators seeking to better understand the diversity of students' ICT literacy and the relationship to their home practices. As this journal is also available internationally, researchers and

educators from other countries will also be able to access the findings and interpret them in relation to their own contexts.

Chapter Six provides details of students' ICT literacy practices from the perspective of six embedded participants. The paper focuses on questionnaire and ICT literacy task data from the Phase 1 of this study, together with student reflection interviews from Phase 2. The purpose of this paper is to explore students' digitally recorded ICT literacy tasks in the context of their ICT experiences. Such a focus draws attention to the complex sociocultural nature of students' ICT literacy, specifically highlighting the range of individual characteristics, support and resources that shape ICT practice. As part of the thesis, this chapter provides an in-depth exploration of the ICT literacy practices and engagement of six embedded participants from their own perspective, and helps to answer Research Questions 2, "How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?" and 3 "What is the relationship between a Year 6 primary school student's family background and their school-based ICT literacy practices?" As a stand-alone paper, it adds to the literature by exploring the links between primary students' actual school-based ICT literacy tasks and their home ICT experiences, and provides details about factors that can lead to digital inclusion or exclusion. This in-preparation manuscript has been prepared for submission to *Computers and Education,* which has been selected as the target journal for this paper as it is a highly ranked education and educational research journal that aligns with several of the papers' key themes, including computing and communication technologies, social issues and curricula considerations, in a primary school educational context.

Chapter Seven, written as a traditional results chapter, draws from all data sources to present a detailed account of the six selected participants. The chapter draws out the key concepts of habitus, capital and field to uncover the differences in each student's ICT literacy, practices and possibilities. This chapter was prepared as a traditional thesis chapter to allow the space to build rich theoretical cases that is not afforded by shorter journal articles. As part of this thesis, this chapter explores the ICT experiences of the six embedded participants, and helps to answer Research Question 2, "How can the ICT experiences of students be characterised in terms of Bourdieu's theory of practice?" It is intended that this chapter will be adapted in the future for an edited book.

The final chapter, the Conclusion, draws the results chapters together to answer the study's guiding questions and relates them to other relevant empirical studies. The chapter provides a deeper understanding of the 'digital divide' by detailing the ways in which differences in primary school students' ICT experiences at home can work to enable or constrain their school-based ICT literacy practices. The chapter moves on to consider the theoretical and practical implications, which aim to better inform the design of digital pedagogies to promote digital inclusion rather than reinforce existing inequalities. Limitations of the study are also considered, followed by suggestions for future research.

Note that tables and figures have been numbered continuously throughout the thesis, including chapters and manuscripts, to avoid confusion. This includes the numbering of some tables that appear in more than one chapter. Table and figure numbering will be adjusted in the manuscripts prior to submission for peer review.

CHAPTER TWO

ICT literacy and the digital divide: A systematic review of the research investigating school students' ICT literacy and associated practices

Prepared for Educational Research Review as: Apps, T., Agostinho, S., & Bennett S. ICT literacy and the digital divide: A systematic review of the research investigating school students' ICT literacy and associated practices.

This paper presents a systematic review of the literature that investigates school students' ICT literacy and associated practices. A systematic approach to the literature review was chosen, as it provides a robust, reproducible method to identify, select and appraise all studies that are relevant to the literature review questions posed. Such a method was chosen as it provides a scientific approach rather than a subjective appraisal of part of the whole truth (Booth et al., 2012). Literature across three focus areas was retrieved: students' ICT literacy, the digital divide and students' technology practices as explored through Bourdieu's theory of practice. Inclusion criteria were applied during an initial review, followed by an analysis of the remaining papers to produce summaries and identify major themes for each review question. In the context of this thesis, this systematic review makes the following contributions: explains the background to the study by reviewing related empirical research; provides a rationale for this study's methodological approach and theoretical framework; and identifies the research gap that this study addresses. This in-preparation manuscript has been prepared for *Educational Research Review* because it is a highly ranked journal focused on publishing systematic literature reviews on similar topics.

1 Abstract

This systematic literature review explored school students' ICT literacy and associated practices, including details of factors, such as family background and formal schooling, that contribute to digital inclusion or exclusion. Fifty-one articles were retrieved from a search for relevant literature published between 2000-2014: 11 investigated school students' ICT literacy; 32 investigated the digital divide in a school context; and eight employed a Bourdieuian lens to investigate school students' ICT practices. The 11 studies that investigated school students' ICT literacy focused on three key aspects: measuring student ICT literacy, identifying factors associated with ICT literacy and evaluating teaching interventions designed to support and improve ICT literacy. The 32 articles highlighted five key factors that contribute to the digital divide in a school context: i. material resourcing; ii. intergenerational differences; iii. gender; iv. location; and v. family background (as indicated by parental occupation, education and income). Eight qualitative studies framed with a Bourdieuian lens were retrieved. Each study applied Bourdieu's theoretical concepts to varying depths to investigate students' practices in and across home and school fields, digital inequalities and factors structuring digital inclusion or exclusion. The findings from this review highlight that students' ICT literacy performance is generally low-level and reflective of several complex digital inequalities. Moreover, studies casting a Bourdieuian lens over these inequalities reveal the supplementary role of school in shaping ICT practices, suggesting ways that schooling may be contributing to digital inequalities instead of working to address differences.

2 Introduction

In an increasingly technology driven society, considerable importance has been placed on the role of information and communication technologies (ICT) in education. In Australia, this has long been evident in policy documents such as a statement of the Australian Curriculum that identifies ICT competence as one of the seven general capabilities that will assist students to live and work successfully in the 21st century (ACARA, 2012a). The Melbourne Declaration that states that all young Australians should become successful learners who have the essential skills in literacy, numeracy and ICT as a foundation for success in all learning areas (MCEETYA, 2008, p. 9). This declaration builds on the Adelaide Declaration, which stated almost 10 years earlier that students would leave school confident, creative and productive users of new technologies, particularly ICT (DETYA, 2000). Together these policy documents and statements highlight the importance Australian governments have placed on ICT in schooling.

Alongside this educational agenda, much of the popular rhetoric around technology and young people has assumed that due to constant exposure to technology, young people have an in-depth grasp and an almost intuitive knowledge of how to use technologies (Prensky, 2001a, 2001b). While such claims have been widely discredited by empirical research (Fraillon, 2012; Hargatti, 2010, Helsper & Eynon 2013; Livingstone et al 2011 & 2014) the 'digital native' premise continues to be influential outside of academic communities in everyday contexts and popular media (Bennett & Maton, 2010; Hargatti, 2010). Yet, findings from Australia's National Assessment Program for ICT literacy (ACARA, 2012b) and the most recent International OECD Programme for International Student Assessment (PISA) report (2010) show that on average, school students achieve low-level ICT literacy scores, and, most importantly, that a range of economic, cultural and social factors influence these scores. Specifically, ICT literacy was strongly associated with socioeconomic background, with parental occupation being a strong indicator for ICT literacy achievement. These results suggest that school students are not achieving the vision that government bodies have aspired and that there are significant factors outside of school that seem to influence students' success in school-based ICT literacy. The findings also contribute to the growing body of research evidence that highlights the real diversity in children's and young people's ICT literacy

practice (Samuelsson, 2012; Thrupp, 2008; van Deursen & van Diepen, 2013; van Deursen, Görzig, van Delzen, Perik, & Stegeman, 2014; van Dijk, 2005), challenging the pervasive 'digital native' premise. Importantly, failing to acknowledge this diversity risks further isolating students with already low ICT literacy and further exacerbating existing digital inequalities.

Within this ICT focused educational climate, Australia has begun the integration of a national curriculum that includes a general ICT capability embedded within curriculum learning areas, and a stand-alone Digital Technologies learning area to be taught from K-12. This focus on ICT at a curriculum level makes a move towards achieving Australia's educational goals and better addressing patterns of digital inequality. However, successful incorporation of ICT learning experiences into the classroom will depend on how teachers interpret and integrate Australia's new curriculum. It is important for educators to understand the diversity with which students experience and engage with ICT, including variations in ICT literacy, in order to cater for their educational needs. Such an understanding is critical to the uptake of the new curriculum and the design of inclusive learning experiences that enable ICT practices and possibilities for all students.

Recent definitions of ICT literacy extend beyond a focus on skills and knowledge to include context and reflect cognitive complexity. For example, the framework and assessments for measuring ICT literacy as part of the Program for International Student Assessment (PISA) is based on the view that mastery of technology alone does not constitute ICT literacy (International ICT Literacy Panel [IICTLP], 2007). To reflect the importance of new technologies in context, ICT literacy is defined as: "Using digital technology, communication tools and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society" (IICTLP, 2007, p.2). This basic definition is then further detailed to include five critical components: accessing, managing, integrating, evaluating and creating. Each component represents a set of skills and knowledge in a sequence that suggests increasing cognitive complexity (IICTLP, 2007). The PISA framework for ICT literacy therefore includes both cognitive and technical proficiency as distinct skill domains, both of which are necessary components of ICT literacy. That is, in order to perform an ICT task, a person must

apply both cognitive skills (reading and problem-solving) and technical skills (accessing information on the Internet using a search engine).

The definition of ICT literacy adopted in Australia extended the *International ICT Literacy Panel* framework to add a sixth component concerned with responsible use of technology and eSafety (MCEETYA, 2007, p.5). Under this definition, ICT literacy is described as "the ability of individuals to use ICT appropriately to access, manage, integrate and evaluate information, develop new understandings, communicate with others and use ICT responsibly in order to participate effectively in society" (MCEECDYA, 2007, p.3). This operationalisation focuses on six processes required when working with ICT across three levels: working with information (*access, manage, evaluate*), creating and sharing information (*develop new understandings, communicate with others*) and using ICT responsibly (*use ICT responsibly*).

Functional definitions of ICT literacy tend to focus on the ICT skills and knowledge valued in a school context, inadvertently mitigating a range of other ICT practices and processes that students might engage with outside of school. A number of alternative terms have been suggested to better capture the range of skills, knowledge and processes with which individuals engage when working with ICT, including multi-literacies, media literacy, digital competence and digital literacy. Each of these terms draws from a different tradition, taking a different approach to understanding the practices required when engaging with ICT. For example, the terms 'ICT literacy' and 'digital competence' have been associated with technical skills and knowledge, while 'digital, media, internet and multi literacies' are often the focus of conceptual and theoretical work drawing from a sociological or literacy background that focus on the rich sociocultural complexity of an individual's ICT practices and literacy (Buckingham, 2008 & 2010; Lankshear & Knobel, 2015; Selwyn, 2004). In exploring this complexity researchers have drawn attention to a range of economic, social and cultural factors that influence differences in ICT literacy achievement, commonly referred to as the digital divide (Hargatti 2004; Hargatti, 2010; OECD, 2010; Fraillon, 2012).

The digital divide describes the differences between those with the skills and knowledge to make effective use of technology and those without such skills and knowledge. The

term 'digital divide' was originally used to highlight differences in access to computer equipment between the rich and poor. As computers have become more affordable, the meaning of the term has been refined to focus on effective access, which expands the definition of access to include the impact of available resources and supports on the way individuals effectively access ICT. The revised definition of 'digital divide' has been referred to as the 'second digital divide' or 'secondary digital divide' (Hargatti, 2001; OECD, 2010), but as this newer meaning is now commonly accepted, 'digital divide' is used to reflect this newer meaning in this paper. The divide implies a binary view of such differences between advantaged and disadvantaged groups, but recent research suggests a more complex understanding of digital inequalities, highlighting a variety of factors that contribute to the digital divide (ACARA, 2012b, PISA, 2015; Robinson, 2014a, 2014b; Robinson & Schulz, 2013; Van Dijk, 2006).

Studies exploring the complex factors that contribute to the digital divide have benefited from a sociological lens (Selwyn, 2004 & 2010). Such a framing allows researchers to pay attention to the social and cultural structures that shape ICT practices. One useful framing for understanding ICT practice in this way is Bourdieu's theory of practice, which is expressed as [(habitus) (capital)] + field = practice (Bourdieu, 1984, p. 101). This set of relations can be described as: practice resulting from relations between one's dispositions (habitus) and one's position in a field (acquired through accumulation of valued capital), within the current state of play of that social arena (field) (Maton, 2008). A number of researchers have applied this framework to adult and young people's ICT practices and to better understand the digital divide, results from these studies draw attention to the complexities of digital inequality beyond a simple binary divide between the advantaged and the disadvantaged (Czerniewicz & Brown, 2013 & 2014; Peter & Valkenburg, 2006; Tondeur, Sinnaeve, Van Houtte & van Braak, 2010). By contrast the empirical application of a Bourdieuian framing to understand primary students' ICT literacy is a relatively new area of research. While researchers have explored children's ICT practices employing components of the theory of practice (Cranmer, 2006; Cranmer, Selwyn & Potter, 2009; Hollingworth, Mansaray, Allen & Rose, 2011) the application of such a framing to explore measures of school-based ICT literacy is lacking. The potential of such a framework to offer a more nuanced view of children's school-based ICT literacy specifically the ways ICT literacy is both enabled and constrained, and how this may lead to digital inclusion or exclusion is critical in

Australian school context. Given that the latest report on school students ICT literacy shows a significant decline in levels of ICT literacy along with consistent and substantial digital inequalities in achievement (ACARA, 2015) such an understanding could provide insights into the ways schools and families may better support the development of school-based ICT literacy.

The literature review presented in this paper aims to advance understanding of students' school-based ICT literacy, including factors that contribute to digital inclusion or exclusion, such as family background and formal schooling. Specifically, the review explores literature in three key areas: students' measureable school-based ICT literacy; the digital divide; and students' technology practices explored through Bourdieu's theory of practice. The remaining paper explains the methodology used, presents the findings of the literature reviewed and discusses how this review contributes to our understanding of students' ICT literacy. The paper concludes with suggestions for further research and implications for practice.

3 Methodology

A literature search was conducted in two electronic databases: Scopus and Web of Science. These databases were chosen because together they provide access to a significant number of peer-reviewed journals. Three questions guided this literature review. Table 2 lists these three review questions with detailed search terms.

Table 2. Review questions and related search terms

Review question	**Search terms**
1. What research has been conducted to examine school students’ ICT literacy performance?	"ICT literac*” OR "digital literac*” OR "computer literac*” OR "digital competenc*" AND "primary school students” OR "elementary school students” OR "middle school students” OR "secondary school students" OR "high school students"
2. What research has been conducted to examine the digital divide in a school context?	"digital divide*" OR "second digital divide” OR "digital inequalit*” AND school* OR child* OR “young people”
3. How have research studies applied Bourdieu’s sociological tools to better understand school students’ ICT literacy and associated practices?	"Information communication technolog*" OR "ICT" OR "digital technolog*" OR “educational technolog*” OR computer* OR internet) AND Bourdieu* OR habitus OR “technological capital” AND school* OR child* OR “young people”
	"ICT literac*” OR "digital Literac*” OR "computer literac*” OR "digital competenc*" OR “ICT practice*”AND Bourdieu* OR habitus OR “technological capital” AND school* OR student* OR child* OR “young people”

The initial search, conducted based on the search terms outlined in Table 2, returned 390 articles. Each article was then manually reviewed by reading the abstract and applying the following criteria to determine if it would be included in the systematic review:

1. The article represents empirical research. This criterion was applied to ensure claims made in the articles were supported by data and exclude conceptual work, books and grey literature.
2. The paper is published in a peer-reviewed journal. The requirement of peer review was used to ensure the quality of the publications included in the review.
3. The research was conducted in the context of school-aged students from OECD member countries (to narrow the field to similar educational contexts). The context and age of participants was significant as research suggests that school aged children across OECD countries are using ICT in a relatively limited way and that access to economic, social and cultural capital is creating a digital divide in ICT achievement (OECD, 2010). Initially, the inclusion criteria was limited to primary school students; however, as a result of the paucity of work in

this context, criteria were expanded to include both primary- and high-school students. Research focused on adult participants was intentionally excluded as review questions are specifically related to children and young people given the vast differences between adults, children and young people in terms of autonomy, fields and agency.

4. The year of publication was 2000 or after. The year 2000 was selected as an initial starting point as it follows the introduction of the Adelaide Declaration in Australia, which focused the educational agenda on all school students becoming confident, creative, critical and productive users of ICT (DETYA, 2000). This period also marked the emergence of the popular 'digital native' concept (Prensky, 2001a) that, regardless of evidence of the contrary, remains pervasive in public perception today.
5. Articles retrieved for review question 1 provided a measure of students' 'ICT literacy'. This criterion was applied to identify studies that assessed ICT literacy (including patterns of performance) and exclude studies focusing on self-reported descriptive accounts of ICT literacy.

Applying these inclusion and exclusion criteria resulted in a total of 63 articles identified: 12 reporting studies that investigated school students' ICT literacy; 40 exploring the digital divide in a school context; and 11 employing a Bourdieuian lens to investigate school students' ICT practices.

To address the review questions, each of the 63 articles was read, summarised and analysed to identify major themes (Appendix 1 contains the list of themes tabulated according to each research question). The next section presents the findings of this review, structured according to the three review questions.

4 Results

4.1 What research has been conducted to examine school students' ICT literacy?

The 12 studies that investigated school students' ICT literacy focused on three key aspects: measuring students' ICT literacy (6), identifying factors associated with ICT

literacy (7), and evaluating teaching interventions designed to support and improve ICT literacy (2). Six of the studies explored multiple review themes, and thus are discussed in more than one sub-section below. Thematic details are also provided in Appendix 1.

4.1.1 Measuring ICT literacy

Six studies were concerned with capturing a measure of school students' ICT literacy (Claro et al., 2012; Goldhammer, Naumann, & Keßel, 2013; Jun, Han, Kim, & Lee, 2014; Kim & Lee, 2013; Ritzhaupt, Liu, Dawson, & Barron, 2013; van Deursen & van Diepen, 2013). While each study varied in scope and approach to understanding students' ICT literacy and associated assessment strategies, together they reflect a shared agenda for the development of ICT literacy as an essential skill or set of competencies required for competitive and productive future economies. The findings illustrate that much work is required to realise this 'participatory' agenda, as the ICT literacy of children and young people is generally low. In addition, these studies highlight the conditional nature and increasing complexity of ICT skills and competencies encompassed in the broader construct of ICT literacy. A brief description follows of each of the six studies with reference to definitions or aspects of ICT literacy, tools for assessment and key findings.

A Chilean study focused on ICT literacy across three domains – information fluency, effective communication and ethics and social impact – measured 1,185 fifteen-year-old students' ICT literacy during a performance task designed to emulate real-life, school-based situations (Claro et al., 2012). Analysis of student results revealed a stratification of digital skills. The majority of students (72.7%) could solve 'information as consumers' tasks that involved searching for, organising and managing digital information. However, a much smaller group (17.4%) could complete all performance tasks and succeed at 'information as producers' tasks to develop their own ideas and redefine information to create a new information product.

Similarly, results from a large-scale Korean study that administered an Internet-based task using simulated software environments to 15,558 middle school students highlighted variation across processes of ICT literacy (Kim & Lee, 2013). Framed by the Korea Education Research & Information Service (KERIS), the study defined ICT

literacy abilities as: recognition of problem; exploration of information; analysis and evaluation of information; organisation and creation of information; use and management of information; and communication with information. Students scored strongly on tasks assessing the skills ‘ability to recognise a problem’ (57.17%) and ‘use and manage information’ (53.83%), but achieved low scores on tasks assessing ‘ability to explore information’ (36.5%) and ‘ability to organize and create information’ (40.83%) (Kim & Lee, 2013). The study’s key findings also indicated the generally low level at which these Korean middle-school students performed, with the majority (57.7%) performing at a basic level, and 31.4% achieving an average level. The remaining 10.9% achieved the highest level.

A smaller study measuring the Internet skills of 54 Dutch secondary students through the completion of four online assignments, together with observations of performance and time spent processing, recorded low student scores in both information skills and strategic information skills (van Deurson & van Diepen, 2013). Information skills were defined as locating required information through choosing a website or a search system to seek information; defining search options or queries; selecting information (on websites or in search results); and evaluating informational sources. Strategic information skills were defined as taking advantage of the Internet through the following processes: developing an orientation toward a particular goal; taking the right action to reach this goal; making the right decision to reach this goal; and gaining the benefits resulting from this goal (van Deurson & van Diepen, 2013, p. 219). The study’s authors concluded that the level of information and strategic Internet skills among participants had much room for improvement. Based on the performance test, the authors highlighted the conditional relationship between the two identified skill sets, suggesting that information skills are first required to build strategic information skills. Additionally, the authors advocated the inclusion of both information and strategic skills as standard components of the Dutch educational curriculum.

Each of these three studies made a distinction between basic and advanced ICT literacy. There are similarities between van Deursen & van Diepen’s (2013) Internet information skills, Claro and colleagues’ (2013) ‘information as consumers’ skills and Kim and Lee’s (2013) ‘use and manage information’ processes. Across these three studies, participants achieved most confidently in these basic ICT literacy skills. Additionally,

there are similarities between strategic Internet skills (van Deurson & van Diepen, 2013), 'information as producers' (Claro et al., 2013) and 'ability to explore information and organize and create information' (Kim & Lee, 2013), all of which require students to problem solve, synthesis, redefine and create. All three studies found that students achieved the weakest results in these more advanced skills.

Another study explored the ICT literacy of 5,990 middle school students in the United States. Proficiency was measured through simulated software environments composed of 67 performance tasks and 40 response items (Ritzhaupt et al., 2013). The study's findings briefly summarised overall patterns of strength and weakness before providing a detailed exploration of performance patterns indicative of digital inequalities (detailed in Section 4.1.2). ICT literacy was defined as inclusive of five domains: technology operations and concepts; constructing and demonstrating knowledge; communication and collaboration; independent learning; and digital citizenship. While the patterns of strength and weakness are only briefly described, they reflect similar findings to the above-mentioned studies from Chile, Korea and the Netherlands, in which students performed better when consuming rather than producing information.

Of the six papers, two focused on understanding specific components of the broader construct of ICT literacy – computational literacy and basic computer skills – with similar findings to those measuring a broader set of ICT literacies. These two studies are explained below.

A Korean study explored computational literacy as one component of ICT literacy, drawing on a nationally representative sample of 40,072 elementary students (Jun et al., 2014). In a Korean school context, ICT literacy is comprised of three domains: fundamental concepts, contemporary skills and computational literacy. Computational literacy, defined as solving problems, designing systems and understanding human behaviour by learning the basic concepts of computer science, had not previously been measured in Korea's national ICT assessment program. Participating students completed a 36-item Internet-based simulation task, and analysis revealed scores below the expected standards, with average scores at a basic level in terms of using ICT for word processing, Internet searches, emails, games and online communities. Across the national ICT assessment, scores for computational literacy were lower than those for

fundamental concepts and contemporary skills. It seems that while students received the highest scores in the knowledge and skills domains, they were not able to translate this achievement across to computational literacy, indicating an increased level of cognitive ability required to operate within the computational literacy domain. The authors suggested that this result may be due to the lack of experience elementary students have in situations requiring computational literacy; however, no associated factors were explored. In the context of this review, these findings suggest two points worthy of consideration. First, like the other retrieved studies, this study highlighted the hierarchal nature of skills required to engage with ICT. For example, students first require basic skills and knowledge access to be able to operate at more complex critical and creative levels. Second, the study's findings suggest that, in the Korean context, possessing basic skills and knowledge does not simply translate into higher order skills, such as computational literacy.

A German study took a different approach to investigating ICT literacy by measuring secondary students' basic computer skills (BCS ability) together with their speed of accessing, collecting and providing information (BCS speed) (Goldhammer et al., 2013). Participating students completed an interactive performance test, for which their response time was also collected. The study also measured practical computer knowledge, word recognition, self-reported computer skills and electronic reading ability. The results suggested that high-achieving students tended to be fast, and that BCS speed and ability had a strong correlation with knowledge on the solution of practical computer knowledge tasks. These students performed well during a measure of electronic reading ability, including the selection and synthesis of a range of information sources. This finding again highlights the hierarchical nature of ICT skills, drawing attention to the practical implication of first developing students' basic computer skills before expecting them to engage in a meaningful way with more complex ICT tasks.

In sum, the six retrieved studies defined and measured ICT literacy differently across a range of contexts. The studies provided a variety of different terms and phrases to describe ICT literacy. Yet the retrieved studies also shared a common conceptualisation of ICT literacy as a range of technical skills and processes that increase in complexity from more basic skills, such as finding and reading information, to more complex skills,

such as producing information (E.g. Blogging - analysis, synthesis, creation of new ideas). These assessments of ICT literacy indicate students' generally low level of ICT achievement while drawing attention to the hierarchical nature of ICT literacy. The findings suggest that basic technical skills are first required to consume information and then skills in consumption (access, manage and evaluate) are required to engage in higher order thinking to produce and generate new information (develop new understandings and communicate with others).

4.1.2 Factors associated with ICT literacy

A range of factors associated with patterns of ICT literacy were identified within seven of the 12 studies. Four of these papers provide details of complex-structuring factors, including socioeconomic status (SES), age, educational level, daily use, purpose of use, intensity of use and confidence (Claro et al., 2013; Kim, Kil, & Shin, 2014; Ritzpauht et al., 2013; van Deursen & van Diepen 2013). Ritzpauht et al. (2013) detailed significant patterns of digital difference in regard to gender, socioeconomic background and ethnicity. Based on an assessment of 5,990 US teens' ICT literacy, conducted using simulated software environments, students who were high-SES, female or white outperformed their counterparts. While Claro (2013) found high-SES, physical access, daily use and confidence associated with ICT-related activities were all positively associated with higher ICT-related activities. Van Deursen and van Diepen (2013) recorded students' level of education as positively associated with ICT literacy, indicating that as students progress through formal schooling their ICT proficiency increases. Examining Korean national level ICT test scores, Kim, Kil and Shin (2014) identified a range of variables influencing ICT literacy, including gender, school use, daily use, education level, satisfaction with ICT learning experiences, school location and infrastructure. The study aimed to evaluate the effect of these variables on the students' ICT literacy scores. Based on a sample of 11,767 elementary students in 173 schools, the key findings suggest that variables positively associated with ICT literacy included computer usage for purposes other than study such as news, daily living information and games; the completion of computer courses related to ICT literacy; and high satisfaction levels of students in school classes using ICT. Additionally, the study found that the more extensive the ICT infrastructure and the larger the regional size and the higher the academic achievement of the school, the higher the students' ICT literacy

level (Kim et al., 2014).

Two of the retrieved studies focused on gaming as a factor associated with students' ICT literacy (Appel, 2012; Biagi & Loi, 2013). One study investigating the relationship between gaming, social media use and students' ICT literacy found greater time spent playing games on a computer was related to higher scores on practical and theoretical computer knowledge (Appel, 2012). In addition, practical computer knowledge was higher for adolescents who liked playing shooter, fantasy or Facebook-based games. Frequency of social media use was also associated with higher scores in practical computer knowledge. This relationship was mediated by a decrease in computer anxiety, not by more positive attitudes toward the computer (Appel, 2012). Time or intensity of use devoted to entertainment activities has also been found to correlate positively with academic performance as well as ICT literacy. Investigating links between ICT and learning, a different study explored how the type and intensity of students' ICT use related to academic performance (Biagi & Loi, 2013). In this investigation gaming was the only activity for which a positive correlation was found between intensity of use and PISA achievement data.

In contrast to the above studies that explored factors associated with ICT literacy, one study, drawing from a psychological background, sought to understand whether poor ICT literacy performance could be explained by a digital dysfunction (Thorvaldsen, Egeberg, Pettersen, & Vavik, 2011). This preliminary investigation identified three primary students from a broader sample of 144 using a filtering sample. The three students were selected by applying a filter based on the following criteria for 'digital dysfunction': low digital literacy in combination with a range of variables that would typically be associated with strong ICT literacy including: sufficient exposure and training; positive attitudes and low computer anxiety; and scores well above critical limits in Norwegian (mother tongue), mathematics and practical/esthetical subjects. The authors proposed that the identification of three students who exhibited low digital literacy regardless of adequate exposure to training, positive attitudes about computers, low computer anxiety and high academic test scores in other learning areas, may be considered atypical and thus indicative of the existence of 'digital dysfunction'. In addition to suggesting that 'digital dysfunctions' exist, the authors advocated that digital

literacy may be independent of other basic literacies. While the key findings of this study made a claim for indications of digital dysfunctions within the sample, the authors overlooked a variety of complex individual sociocultural factors found by other the studies reviewed (Appel, 2012; Claro et al., 2013; Ritzpauht et al., 2013; van Deursen & van Diepen, 2013) to be commonly associated with lower levels of ICT literacy.

In sum, six of the seven reviewed studies suggest that ICT literacy is positively associated with a range of complex sociocultural factors including: advantaged family backgrounds and gender (higher-SES, female, white, Anglo-Saxon heritage); level of education (as school level increases, so does ICT proficiency); high levels of confidence, increased physical access and daily use; and greater time, frequency and intensity of use. One study sought look beyond these factors in an attempt to isolate potential digital dysfunction (Thorvaldsen et al., 2011).

4.1.3 Supporting ICT literacy

Of the 12 studies examined, two were detailed qualitative investigations focusing on the evaluation of teaching interventions to support students' ICT literacy development. One intervention investigated the potential of Internet Reciprocal Teaching (IRT), a variation of Reciprocal Teaching that that promotes modelling and discussion of effective strategies to increase digital literacy. Key findings from the study illustrate that IRT initially enabled students to explain and demonstrate appropriate strategies for locating and evaluating information on the Internet; however, students could not transfer these strategies to independent or small group work (Colwell, Hunt-Barron, & Reinking, 2013). The second study explored the impact of embedded instructional software designed to foster deeper engagement with the online inquiry process (Zhang, 2013). For this inquiry process, eight Year 6 students were required to generate their own research question and sub-questions and then search for information online. The instructional software, embedded in the Internet browser, was designed to scaffold this process. In contrast to the first intervention, the study's results indicated that the instructional software had little influence on participants' information evaluation and note taking. Screen videos of participants' online activities and conversations revealed that regardless of digital prompts students made quick and emotional evaluations of web sources, with most students demonstrating difficulty responding to the software prompt

concerned with author bias. The students were also unable to collate and synthesise information to answer the inquiry question, producing a list of vague notes.

Together these two studies illustrate the low-level strategies that students draw on when working with, evaluating and synthesising information, regardless of instructional support. Such findings suggest that formal ICT literacy does not occur through simply engaging with ICT. Practically, the findings cast light on the difficulties of supporting the development of ICT literacy, particularly in relation to higher order processes required in deep learning experiences. As Colwell and colleagues (2013) point out, implementing instruction that inculcates the necessary dispositions that will lead to appropriate formal strategies is challenging.

4.1.4 Summary

In summary, 12 studies investigated school students' ICT literacy. Findings from these studies illustrate that ICT literacy is a broad construct made up of smaller skills and processes that are conditional in nature and increase in complexity. Basic computer skills are required to engage with information, and skill in engaging with 'information as a consumer' is first required to engage with 'information as a producer'. In addition, ICT literacy is associated with a variety of complex factors.

The retrieved studies for review question one are commonly underpinned by operational definitions of ICT literacy that focus on skills and competencies. Overall, the results detail lower-than-expected levels of ICT literacy across a number of OECD member countries. The results suggest that children and young people are using technology in limited ways, and that this low level of ICT literacy is exacerbated by a variety of sociocultural factors, such as socioeconomic status, age, educational level, daily use, purpose of use, intensity of use and confidence, which contribute to a gap in achievement commonly referred to as the digital divide. Such an understanding of children's ICT literacy performance draws attention to the shortcomings of understanding ICT literacy as a discrete set of skills and competencies, while supporting conceptualisations of ICT literacy as embedded in social and cultural contexts. Further, research detailing teaching interventions designed to build ICT literacy, illustrates the real challenge in doing so. A better understanding of the digital divide, paying attention

to the social and cultural aspects of ICT literacy is significant in overcoming such a challenge to build ICT literacy for all students and realise the ‘participatory’ agenda of education policy.

4.2 What research has been conducted to examine the digital divide in a school context?

Forty articles examined the digital divide in a school context, from which six major themes emerged through examination of key findings. Of these six themes, four key factors influencing the way young people access and use ICT emerged from analysis: material resourcing (3), gender (5), location (4) and family background (14) (as indicated by parental occupation, education and income). Other retrieved studies profiled students’ ICT experiences and use (9), while a different subset explored school experiences and the digital divide (8). It is important to note that three of the retrieved studies explored multiple review themes; these details are provided in Appendix 1.

4.2.1 Material resourcing

Three of the 40 studies explored the role of material resourcing of computer technology and Internet connectivity in shaping young people’s ICT practices. This focus indicates that the access a young person has to computers and Internet has implications for their engagement and use of technology (Huang & Russell, 2006; Lim, 2009; Yelland & Neal, 2013). A study of Internet access among young people in Singapore found that students with high-quality home Internet access tend to have greater online proficiency, while those with intermittent access lacked the opportunities to develop online skills to the level of their peers (Lim, 2009). Similarly, a US study focused on the relationship between technology accessibility and academic achievement. However, the findings from this research highlighted the complexity of this relationship, making reference to a range of other contributing factors including selected subjects of learning, student use of technology and socioeconomic conditions (Huang & Russell, 2006). Such complexities are further illustrated in an Australian study exploring the role of physical access in bridging digital inequalities (Yelland & Neal, 2013). Through the provision of computer and Internet access over a three-year period to support disadvantaged families in digital activities at home and at school, participating families embraced technologies and

expanded digital possibilities. However, simply providing access did not afford participating families the social and cultural capital required to decrease the divide (Yelland & Neal, 2013).

Overall, the findings from the three retrieved studies that focused on material resourcing indicated that while physical access is a necessary foundation for digital inclusion, physical access alone does not ensure digital inclusion. Beyond having access to computers and the Internet, young people and their families require support along with social and cultural resources to further broaden possibilities and enable a wider range of ICT practices. Access to support and social and cultural resources and can enable individuals to make meaningful use of ICT. Without the capacity to make meaningful use of ICT, the provision of material resources will only serve to reinforce existing social divides. The remaining studies addressing the digital divide focus on effective access. These papers highlight a shift in educational technology research that acknowledges both the ubiquitous nature of ICT in modern life and the complex sociocultural contexts in which ICT practices occur.

4.2.2 Gender

Five studies were concerned with the role of gender as an important differentiating factor in the way young people use technology (Broos & Roe, 2006; Drabowicz, 2014; Ilomäki, 2011; Jackson, Zhao, Kolenic, Fitzgerald, Harold, & Von Eye, 2008; Robinson, 2014a). Together these studies highlight persistent gender inequalities in favour of boys in all OECD countries.

Drawing on PISA ICT usage data, a comparative study of gender and ICT use across 39 countries points to the persistence of gender inequality seemingly in favor of boys (Drabowicz, 2014). More specifically, boys used computers more often than girls at both home and school, and boys reported ICT use for entertainment more often than girls. Additionally, the level of a country's gender equality did not have any statistically significant effect on gender gap in educational use of ICTs. The authors concluded by suggesting girls' lower frequency of playing computer games might have negative consequences for them and for gender equity in the future. One study investigating psychological correlates of the digital divide among a representative sample of 1,145

Flemish adolescents supports the view that a substantial digital divide exists amongst young people, with significant differences found on the basis of gender (Broos & Roe, 2006). Based on a quantitative self-administered survey to determine the predictors of ICT use among adolescents, boys scored higher than girls in computer self-efficacy, Internet self-efficacy and perceived lack of computer control. Similarly, a Finnish survey study of 945 adolescents highlighted the gendered nature of ICT use, with males reporting increased time of use and technical knowledge (Ilomäki, 2011). While the authors argued that gendered differences relating to technical aspects of ICT would most likely remain, given the male-gendered nature of ICT, they also asserted that communicative ICT use is gender neutral, as such usage is not connected to technical aspects of ICT.

By contrast, one study focusing on high school students' information-seeking practices found that while there were no gender differences between skilled information seekers, there were gender differences relating to information evaluation between unskilled male and female students (Robinson, 2014a). Specifically, unskilled females were more likely to naïvely 'over-trust' when evaluating information compared with their unskilled male peers, who were more likely to disengage and under-trust information. The author explains this exploratory finding in terms of Ethier and Deaux's application of social identity theory (1994 cited in Robinson, 2014a), which predicts gendered reactions to self-efficacy deficits. For unskilled male students, distrust and disengagement resulted from masculine self-conception demanding control even if it meant losing potential benefits. In contrast, for unskilled female students, naïve over-trusting resulted from a well-meaning openness, not threatening to their femininity, coupled with ignorance about their lack of understanding. These findings illustrate how gender roles can affect students' information evaluation, highlighting the social complexity of young people's ICT practices.

Examining gender differences in the ICT practises of 12-year-old African American and Caucasian Americans, Jackson and colleagues (2008) conducted a survey study with a sample of 515 children. Findings indicated both gender and race differences in the nature and intensity of ICT use. African American girls were the most intense users of the Internet and African American boys were the least intense users of computers and the Internet. Boys regardless of race were most intense users of video games and girls

most intense users of mobile phones. The relationship between ICT uses and academic performance is explored with ICT use predicting academic performance. Length of time using ICT was a positive predictor of academic performance, however amount of time spent playing video games was a negative predictor. Given the results the authors suggest the need to make ICT more available to African American males through early intervention involving parents, educators and community.

All five studies retrieved explore the differences between the way young men and women perceive, engage with and use technology. Collectively, the findings from these studies highlight the role of gender as a structuring factor of the digital divide, while drawing attention to the gendered nature of certain aspects of technology that can lead to inclusion or exclusion and reinforce gendered inequalities.

4.2.3 Location

Four studies examined the effect of geographical location, among other factors, on young people's ICT practices, all drawing attention to uneven geographies of power in information economies (Gibson, 2003; Smith, Skrbis, & Western, 2013; Zhao, 2009; Zovko & Didović, 2013). A US study comparing social networking preferences of inner-city and suburban teens found that inner-city teens were more likely to use MySpace and suburban teens were more likely to use instant messaging (IM). Furthermore, suburban teens were more likely than inner-city teens to be early adopters of both MySpace and IM (Zhao, 2009). The study's findings detailed patterns of social media preference based on geographical location. To explain these patterns the authors pointed to the mediating role of differing social and cultural factors in the uptake of technologies. In a different context, a Croatian study focused on the urban/rural divide between fourth grade primary students. Similarly, key findings from the study highlighted a divide in knowledge of technology use and opportunities to buy new technologies based on location, with students from urban location experiencing greater technological advantage than their peers from rural locations (Zovko & Didovic, 2013). In Australia a spatial dimension to the digital divide is also prevalent; however, the two retrieved studies within this context revealed patterns of ICT use that were more complex than a simple urban/rural binary. Drawing on national census data, an investigation of social and spatial inequalities of information technology usage showed

that factors associated with location and birthplace mediated use of technologies. Yet, the author asserted that the idea of a ‘city-country divide’ in relation to computer and Internet use is too simplistic. However, there were marked differences in general rates of use between Sydney and rural parts of the New South Wales, with higher rates of use generally associated with city locations and lower rates with rural areas. There were also some higher rates of technology use in country areas, and comparatively lower rates of use in parts of Sydney, but these may have been more influenced by educational status, income and indigenous status (Gibson, 2003). More recently, a studying exploring academic and social Internet use of 6,444 high school students in Queensland found differences in the communicative use of ICT according to location. Key findings indicate that students in regional and remote areas spent less time communicating with ICT than their peers in in major cities. Along with location, this decreased engagement was associated with family education status, indigenous status and income (Smith et al., 2013).

Overall, the four studies examining the influence of geographical location detailed the significant influence of a range of factors associated with location upon students’ ICT practices. These factors included differences in home access, school contexts, engagement, family background and academic orientation.

4.2.4 Family background

Sixteen studies explore young people’s ICT practices in the context of their family background. Of these retrieved studies, three focused on disadvantaged or low-SES children and their families, two on more privileged, higher-SES children and their families and six on children, young people and their families across both contexts.

4.2.4.1 Disadvantaged, low-SES families

Four of the retrieved studies focus on the ICT practices of disadvantaged low-income or low-education, regionally located families (Álvarez, Torres, Rodríguez, Padilla, & Rodrigo, 2013; Jackson, Samona, Moomaw, Ramsay, Murray, Smith & Murray, 2007; Jewitt & Parashar, 2011; Sutherland-Smith, Snyder, & Angus, 2003). Focusing on the relationship between academic performance and Internet activities, a longitudinal

American study examined the antecedents and consequences of home Internet use of 140 children from low-income families (Jackson et al, 2007). Key findings from the study revealed that participants academic performance was a predictor of subsequent Internet activities, and Internet activities predicted subsequent academic performance.

An early study examining four disadvantaged families' ICT practices across home and school found that there was a disconnect between home and school use in terms of the gap between practices at home and school (Sutherland-Smith, Snyder, & Angus, 2003). None of the schools participating in the study integrated home practices into formal learning experiences. The authors suggest that providing pedagogical connections may be the first step in bridging the digital divide. More recently, a study focusing on parents' ability to support students' ICT practices showed that parents with lower educational backgrounds and living in rural areas were limited in their ability to provide strategies to regulate their children's Internet use (Álvarez et al., 2013). To better support these parents the authors contributed to an online resource designed to assist families with the development of Internet-regulation skills.

Another study examining the impact of an initiative, which provided a computer and one year of Internet connectivity to low income families with children aged 5 to 9, found that the provision of physical access made a material impact on closing the digital divide. However, the provision of material resources alone did not facilitate connectivity that ensured meaningful use of resources. Instead, connections between people and practices were necessary to support such meaningful use. The evaluation illustrates how at a foundational level physical access is critical to effective access; however, the authors state that attention should be given to the range of cultural and social factors that continue to contribute to digital exclusion regardless of increased access (Jewitt & Parashar, 2011).

These four studies highlight the varied viewpoints from which researchers in the field of educational technology draw. One took an explorative descriptive approach to detail Internet practices of young people (Jackson et al, 2008), while another uncritically details a deficit view of parents, imposing formally valued practices and parenting styles upon them by way of an online resource (Álvarez et al., 2013). While this type of resource was no doubt designed with the best intention, for parents who maintain low

levels of digital literacy, accessing such a resource serves only as another structure towards digital exclusion rather than inclusion. By contrast, the other studies focus on the role of social and cultural factors leading to digital inclusion or exclusion. These studies suggest that instead of imposing practices and values on families, fostering meaningful connections between existing family practices and more formal ICT literacy practices will be important in bridging digital inequalities in a meaningful and situated manner (Sutherland-Smith et al., 2003; Jewitt & Prashar, 2011).

4.2.4.2 Advantaged, higher-SES families

Two of the retrieved studies explored the ICT practices of more privileged families to understand how students from such backgrounds come to acquire stronger ICT literacy scores (Aarasand, 2007; Stevenson, 2008).

Focusing on the digital interactions of eight middle class families, one of the retrieved studies highlights the ways in which privileged families with low-skilled parents and grandparents and higher-skilled children were able to draw on these differences as an interactional resource to engage in playtime with children. This shared playtime allowed parents and grandparents to build their own skills and knowledge as well as the skills, knowledge and confidence of their children. Also exploring the shared realities that occur in the production of family relationships of eight privileged families, Stevenson (2008) found that the relevance of technology in the lives of families and social networks is a key factor that influences family ICT practices. The author found that children and parents with ICT access did not always perceive it as relevant to them, and so at times chose not to use it in their everyday life. The findings challenge the ideas that children are universally interested in ICT and adults will simply become engaged with ICT via their children. The author concluded that ICT forms part of everyday family practices in mundane ways as it is incorporated into pre-existing practices, habits and norms.

The privileged families in both studies demonstrated an ability to fit ICT practices into their everyday family lives, regardless of skill, through shared engagement with relevance, purpose and value.

4.2.4.3 Family comparisons

Eight of the retrieved studies focused on understanding and contrasting the differences in information skills, opportunities, preferences and contextual characteristics between advantaged and disadvantaged family groups.

In terms of digital information skills and opportunities, students from privileged backgrounds outperformed their peers, demonstrating a broader range of skills and strategies. To explain this variation in information literacy skills and opportunities, four retrieved studies draw attention to family background in terms of educational orientation (Hatlevik & Gudmundsdottir, 2013; Iske, Klein, Kutscher,& Otto, 2008; Samuelsson, 2012; Smith et al., 2013). Hatelivik & Gudmundsdottir (2013) pointed to students' accumulation of cultural capital, including number of books in the students' homes, language spoken and academic aspirations. Samuelsson (2012) highlighted the interaction between choice of education and the development and stratification of digital skills. The study's results showed that privileged students, who were enrolled in preparatory programs, had developed a well-thought-out strategy for education in general, with or without ICT. In contrast, less privileged students, who were enrolled in vocational programs, had developed a lower level of digital information strategies and skills. Additionally, students from Australian independent and Catholic schools, who displayed the requisite academic orientation, were more inclined than state school students to recognise and pursue the benefits of online study. These findings suggest that differences in academic use could be a function of broader processes of social reproduction (Smith, et al., 2013). Examining the influence of educational background on young German's (14-23 year olds) opportunities to use the Internet, Iske and colleagues (2008) also found variables of social inequality, associated with socio-demographics, appeared to correspond strongly with differences in Internet usage. However, the findings also drew attention to motives and interest, structured by social contexts, as an additional contributing factor to digital inequality.

Four other studies explored differences in students' online preferences, ICT beliefs and out of school experiences to better understand the digital divide (Ahn, 2012; Livingstone & Helsper, 2010; Tondeur, Sinnaeve, van Houtte, & van Braak, 2011; Vekiri, 2010). Drawing on a quantitative social network preference survey together with public school district data, one study investigating the social media preferences of

secondary students suggested that the social divides that separate teenagers in their offline lives largely predict their choices to participate in online communities (Ahn, 2012). A Greek questionnaire study exploring socioeconomic differences in primary students' ICT beliefs and out of school experiences, found that students and parents from all backgrounds valued ICTs. However, students from low-SES families have fewer opportunities to develop ICT competencies, and express lower confidence in their ICT skills (Vekiri, 2010). Drawing on data from a national survey of teenagers (N=789) that focused on self reported accounts of access, use, Internet literacy, opportunities and risks in the UK, Livingstone and Helsper (2010) examined the role of demographics on Internet literacy and whether Internet literacy skills make a difference to online opportunities and risks. Findings from path analysis suggest that self-reported online skills or internet literacy had a positive influence on online opportunities and an indirect influence on risks, while self-efficacy had no direct influence on opportunities or risks. Consistent with research on the digital divide, it was also found that age and socioeconomic status had a direct influence on young people's access, age and access had a direct influence on their use of online opportunities, and gender had a direct influence of on online risks. Similarly, a large-scale survey study of Dutch high school students aimed at understanding the role of SES and gender on computer ownership, attitudes, use and competencies found that SES moderately affected the computer use profile of young people in Flanders (Tondeur et al., 2011). Further, the acquisition of ICT competencies could no longer be attributed to computer ownership. However, the findings also suggest the professional situation of parents may influence how children are socialised in the use of computers.

Together, these eight studies suggest that differences in ICT practices, preferences and digital information skills related to family background reflect broader processes of social reproduction. These detailed investigations highlight a range of contextual characteristics that work to further structure this reproduction, including differences in academic orientation, opportunities to develop ICT competencies and preferences along with socialisation into computer practices, that lead to varied technology opportunities and confidence.

4.2.5 Profiling computer and Internet use

Moving beyond the class-based binary of advantaged versus disadvantaged, nine of the retrieved papers focused on profiling computer and Internet use to provide a deeper understanding of factors that come to enable and constrain the formal construct of ICT literacy (Barron, Walter, Martin, & Schatz, 2010; de Almeida, Alves, Delicado & Carvalho, 2012; Enyon & Malmberg, 2011, 2012; Hinostroza, Matamala, Labbé, Claro, & Cabello, 2015; Livingstone & Helsper, 2007; Robinson, 2014a; Robinson & Schulz, 2013; Sanz & Turlea, 2012).

A US study that sought to understand secondary students' creative production practices found substantial variation in students' past creative production experience across both socioeconomically disadvantaged and upper middle class high schools. Student computer use profiles, created from self-reported survey data, pointed toward the home setting, technological networks and self-concept as critical aspects that predicted creative production activities. Specifically, creative producers had greater access to technology at home, drew on a broader range of learning resources, taught ICT skills to a wider range of people and expressed more confidence in their ICT ability (Barron et al., 2010).

Moving away from mutually exclusive 'profiles of use' to understand the digital divide, Livingstone and Helsper (2007) suggest gradations of digital inclusion based on the results of a national survey of 9-19-year-olds in the UK. The gradations are based on two main criteria: the breadth of use or range of opportunities (basic users, moderate users, broad users and 'all-round' users) and the frequency of use (non-users, low users, weekly and daily users). The descriptive profiles are consistent with the literature exploring the digital divide suggesting that older children and middle-class children take advantage of more opportunities than younger and less affluent ones (Livingstone & Helsper, 2007).

Differently, a UK study examined individual and contextual factors to explain why young people (8, 12, 14 and 17-19 years) were using the Internet in certain ways (Eynon & Malmberg, 2011). As a result, four types of Internet usage profiles were identified:

- peripheral – young, low Internet self-efficacy and no home internet access;
- normative – average use of communicating, entertaining and information-seeking, low engagement in creating and participating, lowest parental regulation;
- all-rounder – frequent use of the Internet for communicating, entertaining and information-seeking, creating and participating, parents control use; and
- active participator – most frequent use of the Internet for all five activities, more frequent engagement in online participatory behaviours, exhibition of a greater problem-solving approach towards using new technologies.

In contrast to the public rhetoric that often labels young people as digital natives, implying a uniform technical mastery, the largest group of students was normative, followed closely by the peripheral group. Both of these student groups described average ICT use. Each profile draws attention to the role of individual characteristics and contextual factors, including peer networks, parental regulation and self-orientation, in shaping a young person's Internet use. Students who used the Internet more frequently for a range of activities expressed higher confidence, displayed an orientation towards ICT and employed a problem solving approach towards use, as well as being well connected to peer networks and experiencing parental regulation of their use. Building on this work, Eynon and Malmberg (2012) conducted another study that examined the role of individual characteristics, skills confidence and supportive factors on young people's information-seeking behaviours. Based on a nationally representative survey sample of young people aged 8, 12, 14 and 17-19 years, key findings demonstrated the significance of networks of support in understanding the uptake of online information-seeking. Specifically, support networks can play a significant role in opening possibilities through ICT related socialisation and information seeking and learning support.

Paying attention to family support a Portuguese study drawing on quantitative survey data from students aged 8-17 years old in fourth, sixth and ninth grades (N=3049) explored the differences in children's appropriation and use of the internet that contribute to contemporary digital divides (de Almeida et al, 2012). Survey results were analysed for variations in digital practices and parental mediation in relation to social

backgrounds and demographic traits and the results represented in a topological map of Internet use. As a result four clusters of users were identified including self-reliant cybernauts', 'nurtured cybernauts', 'nurtured beginners' and 'unguided rookies' the user clusters support the notion that the digital divide is associated with socio demographic variables and as well as being significantly influenced by parenting styles. Parents with higher educational credentials and revenue (professionals and technicians and, to a lesser extent, employers and managers) tend to exercise guidance over their children's ICT practices compared to less qualified workers who monitor their children's ICT use less closely. Children of the intermediate classes (clerical and sales workers), coming from an intermediate educational background, are in a halfway position concerning these patterns of Internet use and home learning opportunities.

Focusing on home learning opportunities a study of American high school students' detailed differences in digital skill acquisition between skilled and unskilled ICT users (Robinson, 2014a). Through the analysis of focus group and one-on-one interview data the study's key findings highlighted the home learning opportunities of skilled users, including high quality home Internet access, family members who transmit skills and time to refine skills on the computer. These home opportunities allowed skilled users to maximise educational opportunities through skilled peer networks. In contrast, unskilled students had not acquired the skill base to successfully engage in information-seeking. This inadequate skill base typically resulted from a paucity of resources and/or learning opportunities at home, and tended to have a domino effect across contexts. For example, unskilled ICT users' engagement at school tended to leave them without sufficient exposure to ICT learning opportunities. This continued across to peer knowledge networks, which were often equally disconnected from ICT resourcing and knowledge. In contrast, a smaller number of under-resourced yet skilled students revealed that school and partnerships with skilled peers could provide critical ICT learning opportunities. This important finding highlights the transformative potential of educators in providing meaningful connections, access to resources and opportunities to practice that can lead to inclusion rather than exclusion.

Exploring family negotiations over time spent on the Internet, a study of 500 high school students focused on families that prioritised capital enhancing activities, regardless of SES background. Drawing on individual and focus group interview data,

the study's findings suggested that access to resources is mediated by implicit familial social contracts, and that these contracts differ depending on families' level of 'wiredness' (Robinson & Schulz, 2013). Youths from highly wired families enjoyed individualised access; members from partially wired families shared access; and the most disadvantaged youth from unwired homes described sacrifices made by other family members to obtain access outside of the home. Details of family negotiations revealed the deeply social processes of bargaining, cooperation, competition and negotiation that shape ICT practices. For highly wired families individualised access meant that there was no need for competition and bargaining over resources, and thus that youths in these families exhibited high motivation and online self-control, as net time was considered a privilege. Highly wired youths engaged in capital enhancing activities to honour familial trust and sacrifice. For partially wired families access was shared, and therefore required negotiation or cooperation between family members. These young people generally respected other family members' right to share household net time, and certain activities – such as parents' paid work or older siblings' schoolwork – were assigned greater value, and therefore more time, than others. For increased access to household net time, these young people needed to differentiate between more and less appropriate tasks. For unwired families, youths accessed ICT in the school or library, and as a result net time was prioritised for 'worthy activities' such as schoolwork, and entertainment based activities were considered frivolous. While each of these types of families experience different intra-familial contracts that govern ICT use, in all families the use of ICT resources for worthy purposes, including schoolwork or paid work, was distinguished from their use for unworthy purposes, including entertainment or recreation (Robinson & Schulz, 2013).

Differently, a statistical analysis of Chilean secondary students' computer use, aimed to understand how a variety of factors including: socio-economic background, computer use experience, ICT self-reported confidence, ICT skills, and gender influence the profile of activities carried out by students with computers (Hinostroza et al, 2015). The study included the implementation of a computer-based test for measuring students' ICT skills along with two questionnaires: one for students, and one for their parents or guardians. Key findings illustrate that that students of a higher socio-economic background performed socialising and academic activities more frequently; that students who performed better in the ICT skills test invested more time on production

activities; and that female students spent more time on academic activities and less time on gaming activities. Based on the studies results, Hinostroza and colleaugues (2015) draw attention to the shortcomings of ‘profiling’ students’ activities with ICT in terms of providing general descriptions of practices as they are not useful in improving the design of educational policies aimed at harnessing students’ use ICT for learning. Differently, one study exploring demographic, socio-economic and cultural factors and the digital divide focused on profiling online skills that presuppose active participation online, in the form of self created content (Sanz & Turlea, 2012). The researchers conducted quantitative analysis of Eurostat micro-data focusing on young people aged 16-24 years old. Key findings suggest that the ability to contribute to the new media ecology by uploading self-created content is significantly correlated to the activity of downloading online material. Such a finding suggests that skills in downloading are first essential in becoming an active contributor and content creator. Importantly, the authors point to skills in downloading leading to ‘uploading content’ as a cultural mechanism capable of fostering digital inclusion.

Overall, the nine studies profiling students’ ICT practices represent a shift in the empirical focus. Specifically, these studies are indicative of a more holistic framing, which aims to understand and connect with a range of family factors and online skills that influence the way students come to engage and participate with ICT. Table 3 summarises the findings from the nine retrieved studies with reference to the digital divide; specifically, contextual characteristics that work to either enable or constrain children’s and young people’s ICT practices.

Table 3. Contextual characteristics associated with ICT practices

Enabling factors	**Constraining factors**
Quality individualised access	Shared – no/limited access
Skilled support network at home and school, and connected peers	Unskilled support network at home and disconnected peers
An educator focused on providing time and meaningful opportunities	School ICT experiences ineffective and often disconnected from students’ limited skill base
Parental ‘nurturing’ - regulation and negotiation	Minimal parental regulation and negotiation
High frequency practice and rehearsal	
Self interest in ICT	Indifference towards ICT
Confidence	
Problem solving approach	
‘Downloading’ skills and content creation	

Additionally, student profiles illustrated a number of transformative factors, including family members' efforts to ensure access along with educators or technological contacts focused on providing time and meaningful opportunities that increase ICT possibilities. Such experiences allowed students who may have otherwise experienced a narrower set of ICT possibilities to experience increased access, demonstrate stronger skills and become involved in a wider variety of practices and possibilities.

4.2.6 School experiences and the digital divide

Eight of the retrieved papers focused on school experiences and the digital divide. More specifically, four explored the impact of schooling on the digital divide. Collectively, the key findings from these studies highlighted the supplementary role of schools, compared to that of everyday practices, in building ICT literacy (Hohfield, Ritzhaupt, Barron, & Kemker, 2008; Menses & Momino 2010; Samuelson, 2012; Warschauer, 2004). These findings draw attention to the potential of school ICT experiences to reinforce existing differences in students' ICT practice contributing to digital exclusion rather than inclusion.

In contrast, the remaining four studies detailed educational interventions designed to transform student practices and address digital inequalities. Two studies explored the impact of increased physical access to digital technologies (Cotton, Hale, Moroney, O'Neal, & Borsch, 2011; Owston & Widman, 2001). A study testing for increased academic achievement in primary schools based on the provision of one laptop per student, compared with two students to one laptop found little support for the provision of individual computer resources (Owston & Widman, 2001). Although computer access was important, students who worked in pairs were able to support each other to construct knowledge, resulting in greater learning gains than those shown by students working individually. Another study reporting on the impact of a one to one laptop program in a low-SES district points to the teacher's role as a critical factor for students' use of the resources (Cotton et al., 2011). The study found that teachers' use of and attitude towards the laptops was a significant indicator in students' frequency of use and attitudes (Cotton et al., 2011). While the study was limited to understanding the impact of students' frequency of use and attitudes, rather than digital skills and learning,

this key finding illustrates the crucial role of the teacher as a source of social capital. The findings of these two studies point to a critical social aspect of learning. In both studies, pedagogies that included social support were needed to effectively scaffold ICT practice. This reinforces the significance of first understanding the complex social phenomena that lead digital inequalities to better inform the design of more transformative learning experiences.

Focusing on the complex social nature of digital inequalities, the other two studies in this sub-set aimed to better understand students' previous ICT experiences as a basis for the design of pedagogies to address the digital divide. Both studies highlighted the diverse funds of digital knowledge that all students bring to school, while reinforcing the importance of making meaningful connections to prior experiences in the design of digital learning experiences (Degennarao & Brown, 2009; Sims, 2014). Taking a critical approach, an intervention in a New York public school attempted to reform schooling in inclusive ways in the light of digital media (Sims, 2014). Through an ethnographic account of students' experiences within the intervention, the author explained that well-intentioned efforts to address digital inequalities often oversimplify and distort relations between digital media and social inequalities. Misrecognising digital media as culturally neutral overlooks the practices and resources that exist amongst less privileged persons and groups. For example, despite the skill exhibited by many female students in the required game design course, only one girl student regularly attended the school's optional after-school programs that were focused exclusively on creative production with digital media (Sims, 2014). All other regular participants were boys, most of whom came from privileged families. In this article the students who did not demonstrate a disposition toward digital media, as legitimated by the educators, were explicitly and implicitly selected out of the intervention school. The author concluded by asserting that prevailing beliefs about digital inequality need to be significantly rethought, arguing for a differentiated practices approach to pedagogy that makes meaningful connections to situate practices in the learners' worlds.

Meaningful connections between students' worlds and school were illustrated in a narrative study of an after school program for African-American high school students in Philadelphia (DeGennarao & Brown, 2009). The formal program, designed to develop web design skills connected to conventional careers, began as a rigid structure through

which instructors were to teach appropriate uses of technology. Lessons drew on behaviourist principles of learning that see the teacher as active and student passive. The instructors followed a tightly prescribed sequence to impose school valued skills and knowledge upon students. The design did not allow space for what the students knew or cared about, or what might motivate them in terms of technology use; as a result learners felt disconnected and began to resist, making jokes and creating distractions from prescribed lesson plans. Such faults left spaces for negotiation and shared experiences, and instructors found a way to draw on what the learners knew to help them begin thinking about how such an activity had a connected to their own identities. This shift saw instructors move from teacher to facilitator, and students were invited into the conversation to transform the course from control of one path to an opportunity for multiple possibilities. The authors concluded that recognising the existing resources of disadvantaged youth is significant in helping them develop their own identities as technology users, rather than imposing a set of practices upon them.

Both of these qualitative accounts illustrate how moving away from deficit models of practice to allow students to recognise how their identities fit in a technology field can provide legitimate and connected pathways for entry. Only by recognising that all students have resources, can educators transform social and cultural capital to open ICT possibilities (DeGennarao & Brown, 2009).

Together, these eight studies highlight the ways that schools tend to reproduce digital inequalities even when working to address them. The results illustrate how an awareness of the role of education in social reproduction can assist in the design of transformative learning experiences. Such learning experiences must be situated in the lives of learners to make meaningful connections between home and school, and to help students negotiate their ICT practices across these contexts and engage with the new ICT practices imparted through formal learning.

4.2.7 Summary

In summary, 40 research studies were found that examined the digital divide in a school context. Collectively, the empirical work in each of these studies furthers knowledge of ICT literacy as a social and cultural practice. The results reveal the ways that ICT literacy and the digital divide are structured by a range of individual and socio-cultural

factors and the ways in which schools tend to contribute to the digital divide rather than build capacity. Overall, four key factors contributing to the digital divide emerged from analysis: material resourcing, intergenerational differences, gender, location and family background (as indicated by parental occupation, education and income). Details of these structuring factors are summarised below in Table 4.

Table 4. Structuring factors contributing to the digital divide

Structuring factor	Details
Material resources	• Access to technology equipment and infrastructure is significant in first necessitating ICT practices. • Enabling access to ICT alone does not sufficiently address existing digital inequalities: beyond physical access, individuals require support and resources to be able to effectively access ICT in a meaningful way.
Gender	• The gendered nature of ICT (technical skills/gaming associated with boys and communicative function associated with girls) along with the influence of gendered traits when engaging with ICT can lead to digital exclusion and reinforce gendered inequalities.
Geographical location	• Uneven geometries of power related to information economies are considered as a country-city divide • Yet, a country-city binary is too simplistic, given the range of other structuring factors related to location that also shape ICT practice, including home access, school context, academic orientation, parental education and employment.
Family background	• A range of family factors were examined, in isolation and together, that shaped children and their families ICT practices and possibilities. These factors included access, home sharing, available support, connected experiences at home and school, orientation and approach towards ICT, parental regulation, practice, rehearsal and confidence.

These structuring contextual factors contribute to the digital divide by shaping children's and young people's ICT practices and possibilities, highlighting the divide's complexity. Such complexity challenges the binary nature of the term 'digital divide', suggesting that the diversity of ICT practices is more reflective of a range of nuanced digital inequalities that are shaped by a range of individual (disposition/interest) and social and cultural (access, SES, support, technological contacts, parental regulation etc.) factors. This understanding further supports a conceptualisation of ICT literacy as more than a set of skills and competencies to be simply acquired equally by all learners. While school has traditionally been shown to have little effect on reducing these digital inequalities, a small number of studies have begun to detail transformative practices.

These practices first acknowledge the complex socio-cultural nature of ICT literacy and attempt to situate learning experiences in students' worlds.

The following section of the review focuses on research studies guided by Bourdieu's theoretical to better understand the nuanced complexities of children's ICT practices to better inform such transformative practices.

4.3 How have research studies applied Bourdieu's sociological tools to better understand school students' ICT literacy and associated practices?

A critical understanding of students' ICT practices is important to address the social, political, economic and cultural complexities of technology and education. The empirical application of Bourdieu's sociological tools offers researchers the ability to better understand young people's ICT practice in context, particularly the structures that shape ICT possibilities and contribute to digital inequalities.

The literature search retrieved eleven articles detailing qualitative studies of technology in school contexts framed with a Bourdieuian lens. Each study applied Bourdieu's theoretical concepts to varying depths to investigate students' Internet skills and literacy (3), ICT practices in and across home and school fields (6) and digital inequalities including factors structuring digital inclusion or exclusion (2). A discussion of the theoretical approach and findings pertaining to each theme follows. Ten of the retrieved studies were conducted in a secondary school context and one in a primary and secondary after school program.

4.3.1 Internet skills and literacy

Three of the retrieved studies employed Bourdieu's constructs to explore Internet literacy and skills of secondary students (Andersson, Bohlin, Lundin, & Sorbring, 2015; Robinson, 2011; Underwood, Parker, & Stone, 2013). Taking a narrative approach Andersson (2015) used Bourdieu's social, cultural and symbolic capital together with Giddens' concept of pure relations to explore adolescents' use and perceptions of the Internet. Data was collected from 121 secondary students (16-18) who completed

background questions and wrote narratives focused on the role of the Internet in their lives during 45-minute lesson. Content analysis was applied to narratives to first identify emerging themes and then appropriate theoretical constructs. The findings illustrated the ways that adolescents converted Internet literacy into social, cultural and symbolic capital. Students described how the skills and competence achieved through Internet use became strong assets in other contexts, for example school.

Employing the concept of 'relational habitus', as an extension of Bourdieu's work, Underwood and colleagues (2013) conducted an exploration of an after school program that linked undergraduate and K-12 students together to support the productive use of ICT for learning. Data was collected around informal learning experiences of creating a comic in the form of pre and post ICT tests, observation field notes and videos of children and undergraduate mentors engaged in the program's after-school activities. The findings revealed that the participants gained key digital literacy skills transferable to academic settings when working together without formal instruction to complete the assigned task. Students negotiated understanding to 'figure out' how to use the application to create their own comics, demonstrating that beyond technical skills and knowledge, digital literacy is a socially distributed knowledge.

Theoretically, Underwood and colleagues (2013) critiqued Bourdieu's concept of habitus as simply describing an individual's disposition. Instead extending the concept to relational habitus, describing the intersubjective configuration of social elements, including self, tools, tasks, and others. The authors suggest that such an extension enabled observations of how students came together, how these modes of coming together resulted in differences in the social organisation of intersubjective processes, and finally, what these differences revealed about learning and digital literacies. However, a focus on Bourdieu's construct of habitus alone demonstrates a misinterpretation of the theoretical construct, which Bourdieu himself defines as relational. Moreover, Underwood and colleagues' (2013) 'relational habitus', including self, tools, tasks, and others, might be better understood through capital and field, once again, drawing attention to the interrelated nature of the constructs.

The above studies employ constructs from Bourdieu's theory of practice, in isolation, to explore self reported accounts of Internet literacy, test ICT skills and conduct

observations of learning (Andersson et al, 2015; Underwood et al, 2013). The findings suggest Internet literacy is transferable to other contexts and that students learn digital skills and knowledge through negotiation. The methodologies and analysis highlight the potential of Bourdieu's constructs in understanding ICT practices, while drawing attention to the limitations of narrowly employing parts of the interrelated theory of practice.

In contrast, Robinson (2011) explored the constraints and opportunity costs shaping high school students' information seeking for college and career. Drawing from focus group data with 300 students, four distinct profiles of information seeking are outlined. Each profile is detailed in terms of 'information habitus', internalized stances towards information seeking, and information opportunity structures to illuminate the structured and structuring information-seeking situations of young students. The profiles draw attention to the role of information capital in shaping opportunities and in turn information habitus. This study is part of a larger body of conceptual and empirical work employing and extending Bourdieu's constructs to understand digital inequality. The paper illustrates the structured and structuring nature of habitus to reveal the nexus of students' information seeking, Internet use, and digital inequality.

4.3.2 Home and school practices

Six qualitative studies were retrieved that focused on understanding young peoples' ICT practices across home and school contexts through a Bourdieuian lens (Beckman et al., 2014; Bulfin & North, 2007; Johnson, 2009a, 2009b; Kapitzke, 2000; Robinson, 2014b).

Four of the six articles studied ICT practice in home and school contexts. One study drew on Bourdieu's work to explore the construction of technological expertise amongst eight secondary students (Johnson, 2009b). Data was collected through interviews and observations within students' home fields. The paper provides details of the eight students, considered teenage experts, ICT practices within both home and school fields. The students typically considered their ICT practice as their primary source of leisure at home and discussed gaining their technological expertise through independent means within this context rather than formal schooling. Details of students' practice within a

school context made reference to Bourdieu's notion of hysteresis, which describes a mismatch between habitus and field. Specifically, the notion of hysteresis was applied to describe the traditional and unchanging education field of formal schooling and misrecognition of teachers acting within the school field. The author suggests that the scholastic view found in school is irrelevant to students, as it is disconnected from their reality. All eight students felt that schooling had little influence in their trajectory towards technological expertise, raising questions about the factors and experiences at home that led to such expertise.

Following this article, Johnson (2009a) aimed to describe the shared habitus of the same eight teenage experts. This shared habitus manifested as a result of a similar orientation towards investing large time periods engaged in technology use for leisure, along with experimentation and absorption in the activity, linked to Csikzentmihalyi's (1988 cited in Johnson, 2009a) concept of flow. A discussion of the students' interpretations of parental understandings followed, introducing the notion of addiction as a generational difference between experts (participants) and newcomers (parents). However, no further application of Bourdieu's concepts was applied in an attempt to understand the role of parents' views in structuring students' home fields and as a form of social/cultural capital that structured habitus. While this study contributes to an understanding of the dispositions of participating students that may presuppose expertise, the results do not make an explicit connection to the intersections of habitus, capital and field and their structuring role upon practice.

Also paying attention to technology expertise, another retrieved article built a detailed discussion of the capital accumulation and construction of one case student's technological habitus (Kapitzke, 2000). The author's conclusion, which contrasted teachers' low skill against the students' expertise, suggested that similar co-working arrangements could assist educators in the uptake of educational technologies. The study first provided a rich contextual description of school, stakeholders and resources, followed by a discussion of the findings that applied key theoretical constructs to the data. The paper provides an example of the way in which concepts of habitus, capital and field can be explicitly embedded in qualitative analysis and discussion of key findings to illustrate factors and experience that presuppose practice, in this case expertise.

More recently, Beckman and colleagues (2014) explored the ICT practices of 12 secondary students, collecting data from technology diaries and semi-structured interviews. The authors employed Bourdieu's key concepts of habitus, capital and field at a conceptual, methodological and analytical level. The study allowed for a discussion of practices through each construct to reveal structuring structures that presupposed practice. The study's key findings indicate that along with existing ICT practices, case students' socialisation, or exposure to technological experiences in both home and school fields, was overall basic. Such results highlight the potential role of education in building students' technological capital, allowing for an expansion of possibilities through learning experiences with technologies.

In sum, the majority of participants from these studies considered the role of secondary school as insignificant in the development of their ICT proficiency and practice. However, a number of participants discussed early learning in primary school and home practices as significant experiences shaping their current proficiency (Beckman et al., 2014; Johnson 2009b).

The remaining two articles reported on studies that moved away from a home/school comparison, focusing instead on students' negotiation of ICT practices across home and school fields. Examining students' ICT practices in this way acknowledges the role of practices in all contexts in shifting and shaping technological habitus (Bulfin & North, 2007; Robinson, 2014b). Exploring the self-reported digital literacy practices of 15-16-year-olds, one study focused on the interconnections of practice across home, school and other contexts (Bulfin & North, 2007). The study employed Bourdieu's construct of habitus, in relation to family practices, to uncover the ways that young people's technology experiences differed. At the same time, it drew attention to the reality that students must move through a variety of 'space-times' when negotiating the practices they enact and encounter regardless of their experience. The authors criticised the home versus school that dominates much of the research, instead suggesting the idea of 'negotiated practice' as a way of better understanding young people's literacy practices and how these are connected and 'worked out' across home, school and other contexts. Moving away from focusing on general groups of students, another study examined the ICT negotiations of highly motivated students from a variety of backgrounds, focusing

on the ways in which high levels of motivation are manifested regardless of ICT access and opportunities (Robinson, 2014b). Highly motivated students were selected based on the following criteria: proactively find information resources to meet educational goals; enroll in at least one college preparatory, honors, or AP class in high school; and plan to attend college. Through an analysis of focus group and interview data, Bourdieu's theoretical constructs allowed three user profiles to be developed: endowed, entrepreneurial and empowered students. Each profile detailed students' varied physical access or opportunity structures along with a description of how students negotiated access or lack of access to become engaged and highly motivated ICT users. Endowed students experienced highly favourable information opportunity structures having that gave access to an abundance of IT-mediated sources of information, non-digital media and knowledgeable family members. Entrepreneurial students experienced considerably fewer information opportunity structures, and resource access carried heavy costs, including extensive planning to obtain basic access. In contrast, empowered students, who also experienced low information opportunity structures at home, had access to substantial information opportunity structures at school. For these students, negotiation between home and school involved the exploitation of school resources and contacts driven by an orientation towards ICT practice: an 'information habitus' that led to transformative experiences (Robinson, 2014b). These rich profiles highlight the empirical potential of Bourdieu's work to not only uncover structures shaping ICT practice and possibilities, but also detail the role of agency in transforming practice.

Together, the six qualitative studies retrieved draw attention to the range of subtle individual, social and cultural factors that work to shape ICT practices, and to the possibilities, including ICT oriented disposition, learning experiences in primary school and ICT practices or socialisation within the home field. Results from two studies that explicitly moved away from a home/school binary draw attention to the importance of understanding the moves that students make to negotiate practice across these, at times competing, fields. Such an understanding of students' agency illustrates the potential of Bourdieu's theory of practice to uncover details of transformation that may assist in decreasing digital inequalities.

4.3.3 Digital inequalities

Two of the retrieved studies used Bourdieu's sociological constructs specifically to explore patterns of digital inequalities in terms of family background (North, Snyder, & Bulfin, 2008) and gender-based exclusion (Taylor, 2005). Both studies provided details of the way that school has been ineffective in addressing such inequalities, as North and his colleagues (2008) explained:

> The school system does not create an availability of cultural capital to all because what is set up as important only has relevance and is accessible to those who are either in line for, or already possess, corresponding cultural capital (p. 903).

In an investigation of students' habitus and digital tastes, one of the retrieved studies collected data from 25 15-year-olds in the form of in-depth interviews and media diaries, in addition to national survey data (North et al., 2008). Data was collected as part of a larger Australia Research Council-funded study exploring teenagers' digital literacy practices. The authors collated this data into vignettes to describe case students' family habitus in terms of orientation towards technologies. The vignettes illustrated differing family histories, including attitudes towards ICT, practices involving ICT and orientations towards the cultural capital privileged in schools. The studies' findings showed that individual practices using new technologies are indeed varied; however, a consistency in digital tastes in those from similar social backgrounds emerged. Analysis of these patterns of digital taste according to social background found that ICT practices in the home field that mirrored school ICT practices led to dispositions that acquired more cultural capital. For example, a female student from a privileged background described a home habitus with an emphasis on education and learning; she detailed ICT practices involving the Internet for schoolwork and reading newspapers. Conversely, ICT practices in the home field that contrasted school ICT practices led to dispositions that inhibited capital accumulation. For example, a male participant from a disadvantaged background described the ways in which a scholarly habitus was not encouraged at home, given that his mother needed help with practical tasks and eBay. Even with exposure to cultural forms in their school and future lives, some young people still showed little interest in using ICT as a result of their habitus contributing to a socially entrenched digital inequalities (North et al., 2008). The authors suggested that

to transform practice and increase possibilities available to students, ICT integration should focus on vocational, creative and communicative aspects of technology use, as well as academic, to make relevant and meaningful connections with all young people and prepare then for life beyond school.

Focusing on a high school ICT internship program, the second study (Taylor, 2005) drew on habitus, field and capital to illuminate the subtle forms of gender-based exclusion that can lead young women to "eliminate themselves from the ICT game" (p. 183). To understand how students' environments structured their experience (and vice versa), survey and interview data was collected from student interns as well as a range of other stakeholders in the in the field/program (e.g. school board coordinators, internship supervisors). The study's key findings revealed a number of structures within the internship program that reinforced the gendered stereotypes that the program had aimed to overcome. These structures included the selection process, positioning of females in less desirable positions within the ICT field, female students' habitus reflective of diverse interests, a valuing of 'soft' skills and, for some, a heightened awareness of future family responsibilities. By the end of the internship, young men were planning to pursue further ICT education, while the three young women involved were less certain about their ICT careers. This result contrasted the program's intention to promote inclusion. Overall, such findings illustrate the misrecognition by educators and program facilitators that ICT and ICT practices are socially and culturally neutral. This misrecognition leads to inclusion for those who already have access to dominantly valued capital and exclusion for those who do not.

The above studies highlight the role of formal schooling and a vocational intervention in achieving the opposite goal from which each set out to achieve as a result of considering ICT as a neutral resource or field (North et al., 2008; Taylor, 2005). Bourdieu's concepts of capital and habitus allowed the researchers to uncover the misrecognition on which the ICT learning experiences were designed and how their enactment served only to reproduce the very inequalities they aimed to address. This suggests that successful interventions need to acknowledge the social and cultural nature of ICT, and situate learning in the context of the learner to address inequalities through meaningful connections. Importantly, this type of intervention or digital pedagogy requires detailed investigation to improve digital inclusion for all students.

4.3.4 Summary

The eleven articles reviewed illustrate the potential of Bourdieu's theory of practice to uncover details of structure and agency in shaping ICT practices. However, applying Bourdieu's constructs is not an easy task. Doing so requires thoughtful consideration and reflection to define the research object and consider the range of contextual factors that shape practice. The retrieved literature illustrates a range of approaches to the empirical application of such a framing, ranging from studies that unequivocally reveal objective structures and provide rich details of agency through robust and transparent application of theory (e.g. Beckman et al., 2014; Bulfin & North, 2007; Kapitzke, 2000) to descriptive studies that rely on the reader to make inferences, which could be strengthened with a richer and more explicit connection to theory (e.g. Johnson, 2009a, 2009b). Additionally, a number of studies focus narrowly on one theoretical construct to analyse ICT practices (e.g. Andersson et al, 2015; Underwood et al, 2013). While such work goes part way to expose the structured nature of ICT practice, it also raises a number of questions about the broader structures and/or individual characteristics at play. Given the brief nature of a journal article it is easily understood why a narrow focus may be taken, however, the reviewed articles illustrate that moving from one construct in isolation to make broad suggestions for theory development is imprudent. Habitus, capital and field are interrelated and an understanding of ICT practices through the lens of one construct is incomplete without another.

In addition, Bourdieu's constructs, as empirical tools, are often criticized as being deterministic, leaving little room for understanding individual agency and transforming practices. Yet, a number of the reviewed studies illustrate the opposite, drawing attention to the potential of the interaction of habitus, capital and field to explain the role of agency beyond objective structures upon an individuals ICT practice. These emerging findings highlight the real transformative potential in the future application of Bourdieu's constructs to empirical investigations of students ICT practices. To better inform the design and examination of critical targeted and meaningful learning experiences that work to address, rather than reinforce, digital inequalities.

5 Discussion

This systematic review aimed to understand the current discourse around school aged children's ICT literacy, including the ways in which associated factors, including family practices and formal schooling, come to contribute to digital inclusion or exclusion. The review analysed 63 articles that examined school students' ICT literacy (12), the digital divide concerning school aged children and young people (40) and school students' ICT practices through Bourdieuian lens (8). Contrary to the pervasive digital native rhetoric claiming that young people are uniformly reliant and skilled technology users (Oblinger & Oblinger, 2005; Prensky, 2001a; Tapscott, 1998) the research evidence retrieved in this systematic review reveals a more complex picture of school aged students' ICT practices. Three questions guided this review:

1. What research studies have examined school students' ICT literacy?
2. What research studies have examined the digital divide in a school context?
3. How have research studies have applied Bourdieu's sociological tools to better understand school students' contextual ICT practices, engagement and ICT literacy?

In response to the first review question, which was concerned with school students' ICT literacy, 12 studies were retrieved. Whilst each of the retrieved studies differed slightly in focus and understanding of ICT literacy, collectively the findings detailed school aged students varied and lower than expected levels of ICT literacy (Kim & Lee, 2013; van Deursen & van Diepen, 2013; Jun, Han, Kim, & Lee, 2012). The findings also drew attention to the conditional nature and increasing complexity of a range of skills within the broader construct of ICT literacy. For example, students required basic computer skills to be able to access, work with, evaluate and consume information, while both basic and information skills are required in order to complete production tasks for which students are required to synthesis, reframe and re-author information to create new products (Claro et al., 2013; Jun et al., 2012; Goldhammer et al., 2013; Kim & Lee, 2013; van Deursen & van Diepen, 2013).

These 12 studies also revealed patterns of ICT achievement associated with a range of complex factors including socioeconomic status, age, educational level, daily use,

purpose of use, intensity of use and confidence (Claro, 2013; Goldhammer et al., 2013; Kim et al., 2014; Kim & Lee, 2013; Ritzhaupt et al., 2013; van Deursen & van Diepen, 2013). This representation of school aged students' ICT literacy is reflected in Australia's National Assessment Program for ICT literacy (NAPICT). Results from the NAPICT indicate that, in general, school students' ICT literacy is generally low, the processes of ICT literacy increase in complexity and patterns of ICT literacy are associated with location, indigenous and socioeconomic status (ACARA, 2012b; MCEEDYA, 2010; MCEETYA, 2007). Internationally, these findings are also replicated in PISA data (OECD, 2010). Together, the results from such assessments suggest that operationalisations of ICT literacy are limited in scope as the overlook the range of social and cultural factors that lead to patterns of performance. A more holistic understanding of ICT literacy, which acknowledges the rich interplay of person and practice, is key in overcoming inequality and understanding the phenomenon frequently referred to as the digital divide (Buckingham, 2008, 2010; Selwyn, 2004).

Forty research studies were retrieved to answer the second review question, which was concerned with the digital divide amongst school aged children and young people. These highlighted a range of complex factors contributing to digital inclusion or exclusion, including material resources, gender, geographical location and family background that structure ICT practices and possibilities. Studies exploring access to material resourcing acknowledge that physical access is first essential; however, material resources alone will not result in strong ICT literacy practices. Rather, people and support networks are crucial in building effective access to ICT (Huang & Russell, 2006; Lim, 2009; Yelland & Neal, 2013). This finding is important in the current educational climate in highlighting the significance of the development of effective human support to ensure that infrastructure investment is successful.

A small number of studies highlighted gender as another factor associated with differing ICT practices that contribute to digital inclusion or exclusion. Boys tended to use ICT frequently and with high intensity for gaming, a practice girls were less likely to be engaged in or invest as much time or intensity in (Broos & Roe, 2006; Drabowicz, 2014; Ilomäki, 2011). The open problem solving nature of game environments can be associated with higher order processes of ICT literacy, and in this sense this practice may lead game playing boys to stronger ICT skills. In contrast, gendered traits emerged

in low skilled information seekers, leading to exclusion for both sexes. Girls were observed to naïvely over-trust online information compared to boys, who under-trusted, leading to disengagement (Ilomäki, 2011).

A number of factors associated with geographical location, including differing ICT practices and preferences, were highlighted (Gibson 2013; Smith et al., 2013; Zhao, 2009; Zovko & Didovic, 2013). However, two studies characterised the notion of a city-country divide as too simplistic, pointing to the significant influence of a range of other factors, including home access, school context and academic orientation, that were associated with practice (Gibson 2013; Smith et al., 2013). This suggests that associating an individual's geographical location with their level of ICT literacy, use and engagement only reveals a portion of the way in which ICT practice is structured.

Studies focusing on the role of family background in structuring ICT practices illustrate a range of complex sociocultural factors that intersect to shape practices, preferences and available possibilities. A number of these studies identified differing ICT practices and preferences associated with advantaged and disadvantaged families (Ahn, 2012; de Almeida et al, 2013; Hatelivik & Gudmundsdottir, 2013; Hinostroza et al, 2015; Samuelson, 2012; Smith et al., 2013; Tonduer et al., 2011; Vekiri, 2010); others profiled students' backgrounds in relation to ICT skills in a way that moved beyond a binary view of simply one context versus another to detail enabling, constraining and transformative factors in relation to formal ICT literacy practices (Barron et al., 2010; Enyon & Malmberg, 2011, 2012; Livingstone & Helsper, 2007; Robinson, 2014a; Robinson & Schulz, 2013; Sanz & Turlea, 2012). In this context school was shown to have little effect on evening out these digital inequalities, serving only to reproduce broader social inequalities (Hohfield et al., 2008; Menses & Momino, 2010; Samuelson, 2012; Warschauer, 2004). However, a small number of studies have begun to build on the emerging body of work, detailing transformative practices that acknowledge the complexity of ICT literacy and attempting to situate learning experiences in students' worlds (DeGennarao & Brown, 2009; Sims, 2014).

The results of studies concerned with the digital divide were not reflective of a uniform approach to exploring or bridging this achievement divide. A number of studies took a deficit view of families and children whose practices did not match those valued within

the formal school field (Alvarez, 2013; Lim, 2009). Others focused on the provision of technology, programs and interventions without paying attention to the social and cultural complexity of ICT practices to 'simply' address the digital divide (Alvarez, 2013; Jewitt & Prashar, 2011; Owston et al., 2011; Yelland & Neal, 2013). Many of these seem doomed to fail at the outset because of misrecognition and reproduction. In contrast, several of these studies pointed to such shortcomings in their findings, asserting that the simple provision of resources did not afford families the capital necessary to level the divide (Jewitt & Prashar, 2011; Owston et al., 2011; Yelland & Neal, 2013). As Taylor (2005) explains, educational interventions specifically aimed at producing meritocratic outcomes without explicit attention to forms of exclusion or social reproduction will be limited in achieving goals.

Taking a different approach, other studies first framed ICT practices as situated social and cultural practices. Thus any recommendations arising from the findings were concerned with bridging the divide not by simply imposing practices and values upon students, but through the provision of meaningful situated connections embedded in critical pedagogies (Barron et al., 2010; DeGennarao & Brown, 2009; Enyon & Malmberg, 2011, 2012; Robinson, 2014a, 2014b; Robinson & Schulz, 2013; Sims, 2014). This is approach is not to be confused with the simple integration of everyday practices in the educational contexts; instead it is about better situating the learner in the field of educational technology to make connections, nurture dispositions and broaden possibilities. This research agenda allows for a more theoretically grounded approach that has the potential to reveal how and why digital inequalities continue to be perpetuated. This type of understanding is critical as a basis for sound educational change that broadens digital possibilities for all students (Bennett & Maton, 2011). In addition, such an approach builds on a richer definition of ICT literacy that acknowledges the complex social and cultural nature of ICT literacy. Fostering such an understanding in policy can assists schools and teachers to move beyond a skills focus to more innovative and transformative practices.

Within this context, eleven studies were retrieved to answer review question 3, concerned with understanding students' practices through a Bourdieuian lens. They illustrated the potential of a sociological framing such as Bourdieu's to provide a deep situated understanding about why and how digital inequalities occur. Findings

suggested that students' ICT practices are influenced by their disposition or inclination towards technology, which structure how students engage with ICT, seek ICT experiences and perceive ICT possibilities (Beckman et al., 2014; Johnson, 2009a; Kapitzke, 2000; North et al., 2008; Robinson, 2011; Taylor, 2005). While access to technological capital is critical in building ICT skills and possibilities, it is important to understand that students with more technological capital at the outset will more easily accumulate more of this kind of capital than their peers with lower stocks of technological capital. Students from middle class, privileged families tend to have larger stocks of the kind of formal technological capital valued in school than their peers from less privileged homes (Bulfin & North 2007; North et al., 2008). Because of this, many educational experiences aimed at increasing ICT skills and competencies can tend to simply reproduce existing social inequalities. Exploring the way students negotiate practices between fields has drawn attention to the way that students with high levels of motivation seek their own capital enhancing experiences, regardless of their existing capital stock, to transform their own ICT practices (Bulfin & North 2007; North et al., 2008).

Methodologically, the reviewed research concerned with understanding students' ICT practices through a Bourdieuian lens highlights the strengths and weaknesses of such an approach. In particular, studies that employed habitus, capital, and field to carefully define the research object, method and analysis were able to provide clear robust theoretical discussion rather than leave the reader to make theoretical inferences. While the analysis in studies that did not provide such connections read as underdeveloped and raised more questions than answers by creating ambiguity around the important theoretical work conducted (Tracy, 2010). Practically, this emerging evidence highlights the need for a research agenda underpinned by a theoretical framing that allows the careful and considerate formation of a basis of knowledge that illuminates how and why digital inequalities are perpetuated. This understanding should form the basis of sound educational change that caters for all students in building ICT literacy through meaningful situated connections designed to build capitals and increase possibilities, rather than reinforce existing achievement divides. Such an understanding is critical in the current educational and social climate, which places much significance on the development of ICT literacy as an essential skill for participation in modern society.

This study focused on articles published in peer-reviewed journals, post 2000, in OECD member countries and within a school context. Because these inclusion criteria were applied to focus the review, a number of limitations must be considered. First, the review included only empirical investigations published in peer-reviewed journals, narrowing the field to exclude the body of conceptual work focused on defining ICT literacy, as well as several key works proposing sociological frameworks for understanding ICT practices and a number of significant large scale reports that were considered in the conceptualisation of the larger research project. Second, only studies conducted in OECD member countries were reviewed to narrow the field to similar educational contexts. Excluding other contexts may have also led to the exclusion of worthwhile methodological approaches. Third, the study was initially designed to focus only on primary students (5-12 years old); however, due to the paucity of work in this context, the inclusion criteria were expanded to include both primary and secondary students (5-17 years old). This gap in the literature suggests a need for a research focus considering the ICT practices of young children in a primary school context. The literature was limited to a school context, based on developmental differences between young adults and children as well as differences in levels of autonomy between the two groups. However, it is acknowledged that in terms of digital pedagogies there are a number of other contexts in which interesting studies are occurring, the outcomes of which may transfer across to a school context. Thus, further research could examine how the lessons learned in other contexts could be applied in a school environment. In addition it is acknowledged that there is a body of work exploring young peoples' ICT literacy through self-reported accounts of practice. This review intentionally focused on school-based measures of ICT literacy and as a result much of this literature was excluded. Thus, further research could examine this body of sociological work and how it can be applied to understanding school-based measures of ICT literacy.

6 Conclusion

The findings of this systematic review suggest that while current educational agendas place significant importance on the role of ICT in education at a policy and curriculum level, students' ICT literacy performance is generally low-level and influenced by

complex sociocultural factors that contribute to digital inequalities. Studies investigating these inequalities highlight the roles of home and school in shaping ICT practices. Regardless of physical access, students with limited ICT opportunities and support experience a lack of effective access. While the potential of school as a site for addressing digital inequalities has been acknowledged, sociological research has begun to provide a rich understanding of the problematic nature of educational interventions that view ICT as a socially, culturally and politically neutral vehicle for the simple acquisition of meritocratic outcomes. In particular, research underpinned by a Bourdieuian lens extends research in educational technology to take into account the complexity of ICT literacy and associated practices. To advance an understanding of children's ICT literacy, further research investigating how students' ICT literacy practices are shaped by their ICT experiences is required. This type of theoretically grounded investigation has the potential to assist educators in the design of situated ICT learning experiences that are connected and meaningful, and promote digital inclusion.

Appendix 1. Results of systematic literature search

*Articles appearing in more than one category are highlighted in grey

Review question	**Research context**		
Question 1	**Primary/elementary (5-12 years old)**	**Secondary/middle school (12-17 years old)**	**Cross-contexts**
Measuring ICT literacy			
General low level	Jun, Han, Kim, & Lee, 2012	Kim & Lee, 2013; van Deursen & van Diepen, 2013	
Patterns of performance	Goldhammer, Naumann, & Keßel, 2013	Claro et al., 2013; Kim & Lee, 2013; van Deursen & van Diepen, 2013; Ritzhaupt, Liu, Dawson, & Barron, 2013	
Hierarchical	Jun et al., 2012; Goldhammer et al., 2013	Claro et al., 2013; Kim & Lee, 2013 van Deursen & van Diepen, 2013; Ritzhaupt et al., 2013	
Measuring components of ICT literacy	Jun et al., 2012; Goldhammer et al., 2013		
Exploring patterns of performance structured by			
Age/schooling level/school factors	Kim, Kil, & Shin (2014)	van Deursen & van Diepen, 2013	
Gender	Kim, Kil, & Shin (2014)	Ritzpauht et al., 2013; Claro et al., 2013	
Daily use	Kim, Kil, & Shin (2014)		
Socioeconomic background		Ritzpauht et al., 2013	
Ethnicity		Ritzpauht et al., 2013	
Gaming		Appel, 2012; Biagi & Loi, 2013	
Digital dysfunction	Thorvaldsen, Egeberg, Pettersen, & Vavik, 2011		
Supporting ICT literacy		Colwell, Hunt-Barron, & Reinking, 2013; Zhang, 2013	
Question 2	**Primary/elementary (5-12 years old)**	**Secondary/middle school (12-17 years old)**	**Cross-contexts**
Material resources	Huang & Russell, 2006		Lim, 2009; Yelland & Neal, 2013
Gender	Jackson et al, 2008	Broos & Roe, 2006; Drabowicz, 2014; Robinson, 2014a	Ilomäki, 2011;
Geographical location	Zhao, 2009; Zovko & Didović, 2013	Smith, Skrbis, & Western, 2013	Gibson, 2003
Family background			
Disadvantaged families	Sutherland-Smith, Snyder, & Angus, 2003;	Jackson et al, 2008	Álvarez, Torres, Rodríguez, Padilla, & Rodrigo, 2013;

			Jewitt & Prashar 2011
Advantaged families	Aarasand, 2007; Stevenson 2008;		
Families – comparisons			
Information skills		Hatlevik & Guðmundsdóttir, 2013; Iske et al, 2008; Samuelson, 2012; Smith et al., 2013	
Preferences and beliefs	Vekiri, 2010	Ahn, 2012; Livingstone & Helsper, 2010; Tondeur, Sinnaeve, van Houtte, & van Braak, 2011	
Profiles		Barron, Walter, Martin, & Schatz, 2010; Hinostroza et al, 2015; Robinson, 2014a; Sanz & Turlea, 2012	De Almeida et al, 2012; Enyon & Malmberg 2011; Enyon & Malmberg 2012; Livingstone & Helsper, 2007; Robinson & Schulz, 2013
School experiences and the digital divide			
Schooling	Warschauer, 2004	Samuelson, 2012	Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Meneses & Mominó, 2010
Interventions	Cotten, Hale, Moroney, O'Neal, & Borch, 2011; Owston & Wideman, 2001		
Critical approach		DeGennaro & Brown 2009; Sims, 2014	
Question 3	**Primary/elementary (5-12 years old)**	**Secondary/middle school (12-17 years old)**	**Cross-contexts**
Internet skills and literacy		Andersson et al, 2015; Robinson, 2011	Underwood et al, 2013
Home and school practices		Beckman et al., 2014 Bulfin & North, 2007; Johnson, 2009a; Johnson, 2009b; Kapitzke, 2000; Robinson, 2014b	
Inequalities		North, Snyder, & Bulfin, 2008; Taylor, 2005	

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CHAPTER THREE

Methodology

Chapter Three is prepared as a traditional methodology chapter, detailing the research questions, study design, theoretical framework, participants and site, data collection procedures, data analysis strategies and verification methods. A traditional methodology is provided in this thesis by compilation to provide a detailed methodological and theoretical description that situates the results papers within the study as a whole.

1 Introduction

This chapter presents the methodology used in this study. It begins by outlining the research questions, study design, theoretical framework, participants and site, data collection procedures, data analysis strategies and verification methods employed. The purpose of this study was to investigate the ICT literacy skills of upper primary school students in one school in NSW, Australia, to understand the variations in ICT literacy in relation to differing family technological capital. The study sought to provide insights from the students' perspectives about the factors that shape their ICT literacy.

The study was guided by a broad research question:
How do primary school students' ICT experiences shape their school-based ICT literacy?
From this central question, three sub-questions were developed:

1) How do Year 6 primary school students perform in terms of their school-based ICT literacy practices?
2) How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?
3) What is the relationship between a Year 6 primary school student's family background and their school-based ICT literacy practices?

2 Study design

2.1 A qualitative approach

Qualitative research is a broad term used to describe research concerned with naturalistic contexts or inquiry (Guba & Lincoln, 1994). Qualitative research aims to provide rich description, and seeks patterns and themes in the data to explore a problem. Qualitative researchers consider reality as socially constructed, focus on meaning and aim to understand participant perspectives by becoming involved in the setting, acting themselves as the primary data collection instrument.

Qualitative research is concerned with "attempting to make sense of or interpret a phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 1998, p. 3). Understanding ICT literacy and associated practices from the participants'

perspective was a central goal of this study. Thus a qualitative approach was taken based on the perspective that reality is a social construct. The qualitative research paradigm allows for a deep contextual understanding of social realities that is sensitive to the multiple social constructions of meaning and knowledge bound by context(s).

Qualitative approaches are also considered useful for exploring research problems on topics about which little information exists – specifically when variables are not known, context is important and the theoretical base is undeveloped (Creswell, 1994). In terms of understanding primary students' ICT literacy and associated practices, a review of the literature reveals there is a paucity of research in this area, and that the research that does exist in this context is generally atheoretical in nature (see Chapter Two). This study sought to address this gap in the literature by detailing a rich empirical understanding of primary school students' ICT literacy practice through a Bourdieuian lens. This theoretical lens framed the study at a conceptual, methodological and analytical level (as explained later in this chapter).

The qualitative paradigm views the researcher as the key instrument of data collection (Merriam, 1998). The role of the researcher is to design and implement a research strategy reflective of the open ended nature of the study. Researchers collect data through face-to-face interactions over time, engaging directly with participants and observing them in-situ, and position themselves by sharing their background and its effect upon their interpretation of information (Creswell, 2007). The end goal is to develop a holistic account that is not bound by causal determination of events, but instead identifies complex interactions of factors in context (Creswell, 2007; Stake, 2000).

This study took a qualitative approach to investigate the phenomenon of interest – that is, *how* primary school students' ICT experiences shape their school-based ICT literacy practices. Qualitative research strives for depth of understanding in natural settings. The researcher seeks "rich descriptions of people and interactions as they exist and unfold in their natural habitat" (Gubrium & Holstein, 1997, p. 6). Accordingly, the use of qualitative methods is guided by the nature of the participants and the research questions that are being addressed, enabling investigations to be located in their natural

settings, providing opportunities to explore the complexity of participants and their associated practices while highlighting the participant voices (Denzin & Lincoln, 1998).

2.2 The case study as a research strategy

Within the qualitative paradigm, this study adopted a case study approach. The case study can be defined as “an empirical inquiry investigating a contemporary phenomenon within its real life context” (Yin, 2003, p. 13). Stake (2000) identifies three common types of case study:

- An ‘intrinsic’ case study is undertaken to gain a better understanding of a particular case.
- An ‘instrumental’ case study is undertaken to provide insights into an issue or examine a generalisation.
- A ‘collective’ case study is conducted to understand a broader phenomenon through investigation of multiple cases.

This case study took an instrumental approach to examine primary students’ ICT experiences together with a measure of school-based ICT literacy in relation the emerging digital divide. In this way, the case study was concerned with a particular situation, differences in primary students’ school-based ICT literacy, in which there are many more variables of interest than data points. This approach relies on multiple sources of evidence, with the researcher needing to converge data in a triangulating fashion. Such a case study also benefits from the prior development of theoretical propositions to guide data collection and analysis (Yin, 2003).

3 The design of this study

3.1 A single case study using an embedded design

The study used an instrumental case design to provide an in-depth examination of Year 6 primary school students’ ICT experiences and school-based ICT literacy, to better understand the variations in ICT literacy in relation to differing ICT experiences and family technology practices. The case study method allowed the researcher to develop a

study design focused on uncovering contextual conditions through the unique combination of methodologies (detailed in Section 6) to offer a new understanding of students' school-based ICT literacy by focusing on ICT literacy performance together with students' reflections of their performance in context of home ICT practices, dispositions, available capital and structuring field conditions.

The single case focus of this study was one Year 6 class of 28 students, of whom 25 consented to participate and six were selected as embedded participants. The single case, illustrated in Figure 1, was selected to represent a typical regional upper-primary public school classroom that included students from a variety of backgrounds. As Yin (2003) suggests, one rationale for a single case study is the examination of a typical case with the purpose of apprehending the circumstances and conditions of an everyday or commonplace situation.

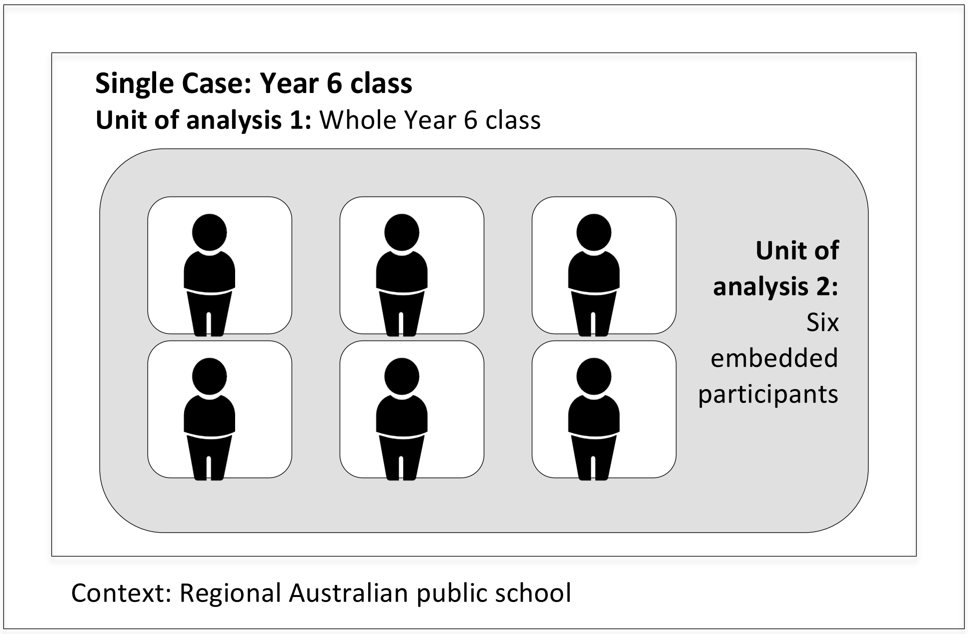

Figure 1. Single case (embedded) design

Embedded within the single case were two units of analysis: the whole class of Year 6 students and the six embedded participants (Figure 1). An embedded case study design is used to increase opportunities for extensive analysis by enhancing insights into the single case (Yin, 2003). The six embedded participants of analysis within the case were individual students chosen to represent multiple perspectives based on their school-

based ICT literacy task results conducted during Phase 2 of this study (detailed below in the data collection strategy). This embedded design was appropriate for this study as it allowed the researcher to investigate the family ICT experiences and school-based ICT literacy of a typical class of Year 6 students. This was followed by an in-depth exploration of six embedded participants across multiple data sources to highlight their perspectives in explaining and exploring their school-based ICT literacy. These embedded participants enriched the larger set of data, providing insights into how and why the digital divide occurs in practice.

Additionally, the single case can also represent a important contribution to knowledge- and theory building (Yin, 2003, p. 40). For example, in the context of this study the single embedded case study design allowed the application of a Bourdieuian lens at a conceptual, methodological and analytical level. Using the theory of practice as a framework for understanding students' ICT practices and associated ICT literacy guided the research design, data collection strategy and, in turn, strategies for analysing data. Theory development to conceptualise the problem in the research design is an essential step in doing case studies, as research design underpinned by theory will provide strong guidance in determining the data collection and analysis strategy (Yin, 2003). In addition, such an application of Bourdieu's theory of practice to students' ICT practices and associated ICT literacy allowed for extension of the theory of practice specifically to ICT practices.

The rationale for the embedded case study design for this research study included the ability to explore – in detail and in a naturalistic setting – Year 6 students' school-based ICT literacy together with ICT experiences to gain an in-depth understanding of the differences that shape primary students' ICT practices and possibilities. This allowed the researcher to consider the complexity of the situation and the interplay of factors, as suggested by Stake (2000). It is also in keeping with the strength of the case study approach in addressing 'how' or 'why' questions, particularly important "when the boundaries between the phenomenon and context are not clearly evident" (Yin, 1994, p. 13).

4 Theoretical framework

4.1 Bourdieu's theory of practice

Research investigating students' home backgrounds and socioeconomic status would benefit from a sociological framing that pays attention to the understandings and 'life worlds' of learners (Selwyn, 2006). One such framing is the work of Bourdieu, which focused on explaining the relationship between people's practices and the contexts in which those practices occur (Webb et al., 2002). Specifically, Bourdieu's theory of practice include 'thinking tools' that provide a set of relations for analysing the workings of the 'life worlds' of individuals through empirical investigations (Bourdieu & Wacquant, 1992). Bourdieu expressed this as an equation: [(habitus) (capital)] + field = practice (Bourdieu, 1984, p. 101). This set of relations can be described as: practice, which refers to an individual's actions and behaviour, resulting from relations between one's dispositions (habitus) and one's position in a field (capital), within the current state of play of that social arena (field) (Maton, 2008).

Habitus encompasses the dispositions that influence individuals to become who they are, and yet includes the conditions of existence, which are displayed every day in their relations to society in and through individual activities (Bourdieu, 1990). Habitus operates below the level of calculation and consciousness, underlying the conditioning and orienting practices by providing individuals with a sense of how to act and respond "without consciously obeying rules explicitly exposed as such" (Bourdieu, 1990, p.76). Habitus is 'structured' by one's past and present circumstances, such as family upbringing and educational experiences. It is also generative, in that one's habitus helps to shape one's present and future practices. It is a 'structure' in that it is systematically ordered rather than random or unpatterned (Maton, 2008). Habitus disposes actors to do certain things, orienting actions and inclinations without strictly determining them (Mills, 2008). For Bourdieu, habitus is fundamentally connected to the field(s) within which it is developed (Bourdieu, 1984; Webb et al., 2002). Hence, practices are not simply the result of one's habitus but rather of relations between one's habitus and one's current circumstances within the field (Maton, 2008).

Fields, according to Bourdieu, are “networks of social relations, structured systems of social position within which struggles or manoeuvres take place over resources, stakes and access” (Everett, 2002, p.60). The field operates like a game in which agents adopt strategies in competition with others to gain the stakes. All play the same game, though not necessarily consciously so (Webb et al., 2002). Society as a whole is a field structured according to relations of domination. Society also contains a range of fields, and should be seen as the dominant field from which other fields are never fully separated (Peillon, 1998). Habitus and field are relational structures, and it is the relation *between* these structures that provides the key for understanding practice. Each helps to shape the other and, significantly, both are also evolving, so relations between habitus and field are ongoing, dynamic and partial (Maton, 2008).

Bourdieu describes capital as the currency of the field (Grenfell, 2009). More specifically, capital acts as a social relation within a system of exchange, and the term is extended to all goods, symbolic and material, rare and worthy of being sought after in a particular social form (Webb et al., 2002). Bourdieu (1986, p. 47) described four types of capital:

- Economic capital, which is immediately and directly convertible into money and may be institutionalised in the form of property rights;
- Cultural capital, which is convertible, on certain conditions, into economic capital and may be institutionalised in the form of educational qualifications;
- Social capital, made up of social obligations ‘connections’, which are convertible, in certain conditions, into economic capital and may be institutionalised in the form of a title of nobility; and
- Symbolic capital, appropriated when one of the other capitals is converted to prestige, honour, reputation or fame.

The first three forms of capital (economic, cultural and social) are used in this study. A discussion of their application is provided in Section 4.4. In understanding capital, it is important to note that capital is not fixed either within or across fields or accumulated over time, and most capital can be exchanged into other forms (Johnson, 2009b). All forms of capital are located within a system of competition and exchange whereby different capitals have different values in different fields.

4.2 Bourdieu and school students' technology practices

In terms of educational research, Bourdieu's work has made significant contributions to understanding the role that schools and school systems play in reproducing social and cultural inequalities whilst legitimising certain cultural practices through hidden linkages between scholastic aptitude and a student's background (Mills & Gale, 2007). Put simply, for many students the fields of the school and their classroom operate on a different set of stakes, power relations, resources and struggles than the field of their home. This difference is greater for some students than others, as school often assumes dominant middle class culture, values and attitudes in its students. Thus students from other backgrounds tend to be disadvantaged in the 'game' of school, regardless of how diverse and rich their experience (Henry, Knight, Lingard, & Taylor, 1988). Recognising how objective relations become embodied in students through the discourses and everyday practices of schools, Bourdieu offers a way of empirically understanding not just what schools do to students, but how they do it (Webb et al., 2004). This understanding can assist schools, policy makers and teachers to better use their capacity to confer capital, consciously drawing upon students' existing stock of cultural capitals to act as agents for change.

Educational researchers have drawn on Bourdieu's concept of habitus and different forms of capital to explain school aged students' practice with ICT. Cranmer (2006) discusses the emerging body of evidence, suggesting that when ICT enter the home they integrate into pre-existing social structures; thus the potential benefits of ICT for education are not experienced in equal measure by all families. Further, North, Snyder and Bulfin (2008) investigated the digital tastes of 25 15- to 16-year-olds, drawing on Bourdieu's notion of habitus. They argued that markers of class, such as a parent's occupation and level of education, are linked with young people's habitus, which in turn influences their digital tastes and practices. These studies suggested that cultural forms produced through technology-mediated practices were part of the young people's habitus. Social background is part of what helps form young people's habitus; this, in turn, affects their approach and interest in ICTs at home and in school.

Differently, a study of parents' views and experiences of school technology practices employed capital, habitus and field to understand how social class positioning can

constrain or enable family ICT literacy practices (Hollingworth, Mansaray, Allen, & Rose, 2011). The study's findings reinforce an understanding of ICT practices as socially situated revealing how parents' differential access to economic and cultural capital shapes their experiences of technology and importantly their ability to engage with their children's learning with technology. Methodologically, the research provides an example of the dynamic and interrelated nature of habitus, capital and field including the different forms that can be understood when exploring ICT practices. Collectively, these studies draw attention to the complexity, diversity and inequality of young people's ICT practices, as well as highlighting the potential of a Bourdieuian lens to understand how and why such patterns occur and critically evaluating the role of education and technology in their production.

Likewise, Selwyn's (2004) conceptual work drew on economic, social and cultural capital to explain the mediating role of economic, cultural and social resources in shaping individuals' relationships to ICT. Detailed in Table 5, 'technological capital' is a characterisation of Bourdieu's capital (1986), highlighting different forms that can be measured in terms of a person's technology experience, while revealing the extent to which 'class' can play a role in use and proficiency.

Table 5. Forms of technological capital

Economic capital	Material exchanges, material resourcing, domestic space of ICT use Economic capacity to purchase ICT hardware and software.
Cultural capital	*Embodied* Investing time into self-improvement of ICT skills, knowledge and competencies in the form of informal learning. Participation in ICT education and training – both formal, or credentialised, and informal, or non-credentialised. *Objectified* Socialisation into technology use and 'techno-culture' via techno-cultural goods (e.g. exposure to ICT via magazines, books and other media), family, peers and other agents of socialisation. *Institutionalised* Formal, or credentialised, ICT training.
Social capital	Networks of 'technological contacts' and support. These can be face-to-face (family, friends, neighbours, tutors, other 'significant others', membership of groups or organisations) or remote (online help facilities, commercial help lines).

(Selwyn, 2004, p. 355)

While this conceptualisation is useful in highlighting the potential of Bourdieu's concept of capital as an empirical tool for critically understanding a person's technology practice, capital is only one component of Bourdieu's 'thinking tools'. It is important to understand that exchange of technological capital does not happen in isolation from a person's habitus and their associated field(s) (see, for example, Cranmer, 2006; Hollingworth et al., 2011; North et al., 2008). Importantly, it is the *interaction* of habitus, cultural capital and field that generates practice (Bourdieu, 1990). Understanding the objective conditions of the social space or field(s) in which practice occurs along with the subjective nature of habitus (both structured and generative) is equally critical in the empirical application of Bourdieu's ideas. Thus a focus on the dynamic, interrelated nature of all constructs is necessary to apply the theory of practice, as practice does not occur in a vacuum.

4.3 Theory of research practice: applying empirical tools

For Bourdieu, the goal of sociological research is to uncover structures of the social worlds that make up the social universe (Reay, 2004, p. 431). As Grenfell (2012) explains, the theory of practice is essentially a theory of research practice, as the whole *raison d'être* of the approach is that the theory should be exercised as an empirical tool. In this way, the researcher focuses on the dynamic interaction (capital exchange) between individuals (habitus) and the surroundings in which they find themselves (field or fields) (Mills & Gale, 2007) offers a way of thinking about and investigating students' ICT literacy practices. Such a focus on ICT practices has the potential to uncover the ways in which students' ICT practices may relate to larger, class-based patterns of difference, reflected in both Australian and international ICT literacy achievement (ACARA, 2012b; OECD, 2010).

Conceptually, such a framework provides a way of thinking about the social world, a sociological gaze, that pays attention to the complex and subtle interplay of structures and relationships that contribute to practice (Bourdieu & Wacquant, 1992, p. 251). This gaze then frames the construction of the research object, throughout the empirical process, by focusing on the systematic set of relationships associated with participants, institutions and the broader social space (Hardy, 2012). Specifically, habitus requires the research focus to be broader than the specific focus under study (Reay, 2004). To

accomplish this, the researcher begins with the individual and then moves to the broader group under consideration (e.g. class, gender or race) to allow for an understanding of both the subjective (individuals as actively engaged in creating their social worlds) and objective (the predefined structure of those worlds) (Bourdieu & Wacquant, 1992). Field, a bounded construct, necessitates the consideration of the social spaces in which practice occurs by focusing on structures of power and position that are acquired through accumulation of valued capital within and of the field in focus. To construct a research object, the researcher must identify the forms of valued capital that operate in it, and must have a sense of the logic of the field. This is an iterative and cyclic process; thus the initial research object should be fluid, as its parameters will change throughout the research process. This is a critical consideration when conceptualising the research object, as it is never possible to analyse completely the ever-changing relationships between capital, habitus and field (Hardy, 2012). Taking a Bourdieuian approach to conceptualising the research object also requires consideration of the researcher's own field position and habitus.

As an empirical tool, Bourdieu's theory of practice and Selwyn's characterisation of technological capital provide a lens for empirical investigations of young people's ICT literacy. Such a lens has the potential to help researchers understand the complexity of ICT practices that may contribute to understanding broader patterns of ICT literacy by providing a way of thinking that looks beyond the ICT practices of young people to focus on how and why these practices occur. Selwyn's (2004) characterisation of technological capital is particularly useful in focusing thinking about the social spaces (fields) in which young students' ICT practices occur, including how structures within differing home fields work to shape ICT possibilities. To glean a sense of the logic of such fields, the researcher might consider which ICT capitals are valued, who holds family positions of power, the impact on family practices and how the accumulations of capital enable or constrain formal ICT literacy. While field theory assists the researcher in thinking about the objective structures that shape practice, habitus focuses on the generative yet structured role of actors. Useful questions to frame conceptual thinking around young people's technology habitus could include: What dispositions do students have toward ICT? Do such expressions shape ICT practices? How have such dispositions been manifested through systematic relationships and available capital

within the family and broader class group? Are dispositions an individual expression of agency or desire?

Methodologically, Bourdieu’s constructs provide a tool capable of capturing a dynamic representation of human activity and developing an understanding of the interrelationships between personal lived experiences and objective structures (Hardy, 2012). Such an approach can be embedded in the design of the study and data collection strategy. Once the researcher constructs the initial research object, consideration can be given to the type of data required to apprehend details of participants’ technological habitus, available capital and objective field conditions. For example, the researcher might consider what objective conditions of a young person’s home field might come to structure habitus and/or ICT practices; what technological capital students draw on when engaging or not engaging with ICT; or what ICT practices and preferences indicate individual or group habitus. Selwyn’s (2004) characterisation of the forms technological capital is a useful tool in this process, as it points to a range of capital types students may draw on in the acquisition of ICT literacy, allowing for the construction of empirical tools designed to apprehend such data directly. Examples of such tools may include the use of direct interview and survey questions or indirect observation and measurement of participant and family ICT literacy practices.

Analytically, Bourdieu’s constructs permit a layered analysis that begins at the individual participant level, allowing the construction of ICT practice profiles that combine details of habitus, capital and field for deep contextual analysis, including the how and why of participants’ ICT literacy practices. Following this individual analysis, a comparison between students, focusing on shared characteristics and differences or points of distinction, can be conducted. This analysis then allows students’ ICT practices to be considered in the context of their positioning in within the broader social field and reconsidered at the individual level after consideration of the role of the broader social positioning on practice (Hardy, 2012; Reay, 2004). This type of layered analysis provides an understanding of practice as a dynamic complex of interrelations that are constructed by the value placed by the most dominate on different dispositions and attributes (Hardy, 2012). Such an analysis has the potential to uncover details of both structure and agency, highlighting the subtle ways in which ICT literacy practices are reproduced or transformed. Embedding theory across three stages of empirical

research (construction of research object, methodological design and analysis) anchors the investigation within a critical perspective that is concerned with giving a voice to those who are usually marginalised in discussions about what technology and education 'is' and 'should be' (Selwyn, 2015).

While there are currently no empirical applications of Bourdieu's theory of *research* practice to better understand a measure of primary students' school-based ICT literacy, a number of case studies have applied Bourdieu's constructs to understand ICT practices within tertiary and secondary school contexts. Two of these studies, detailed below, include details of the underpinning application of Bourdieu's theoretical constructs. A South African case study exploring the technology habitus of disadvantaged university students provides an example of the application of Bourdieu's constructs (Czerniewicz & Brown, 2013). This study focused on individuals' ICT practices while also paying attention to habitus and the ways that various capitals are drawn on and exerted in the field of higher education. Data was collected through a series of qualitative interviews focused on apprehending qualities of habitus by asking participants how they saw themselves as learners and technology users and how they saw the role of the technology in their learning and social lives. This data collection strategy allowed for an exploration of participants' backgrounds and available capital related to their interests, reported confidence and proficiency with ICT (Czerniewicz & Brown, 2013, p. 47). Analytically, Bourdieu's constructs were used directly in coding at an individual student level. This first level of coding was then collated in a matrix to show the value, importance, use and lack of use made by individuals in relation to ICT separately, and then for comparison as a group.

Another case study example within a secondary context employed Bourdieu's key concepts of habitus, capital and field at a conceptual, methodological and analytical level (Beckman et al., 2014). The Bourdieuian framework is evident in the data collection strategy, which used technology diaries and semi-structured interviews to apprehend details of practice by focusing on what ICT students were engaging with, location of engagement, for what purposes and the value they placed on such practices across both home and school fields. This strategy focused not only on practices and attitudes but also on characteristics of fields in an attempt to evaluate the technological capital students had accrued in order to understand their position(s) within the field(s).

Data obtained from this strategy allowed for a analysis of practices through each theoretical construct to reveal structures and dispositions that presupposed ICT practices while highlighting the perspectives of students in relation to their ICT use for education (Beckman et al., 2014).

Both studies illustrate the way Bourdieu's concepts can be conceptualised to construct the research object, applied to data collection strategies and employed throughout analysis to better understand ICT practices. Importantly, this approach allows for the mapping of objective structures and spaces of positions alongside the immediate lived experiences of agents to explicate the categories of perception and appreciation (dispositions) that structure their action from the inside (Bourdieu & Wacquant, 1992, pp. 10-11).

In summary, the theory of practice together with the further characterisation of technological capital provides a sociological lens for thinking about ICT literacy as a social practice, as well as a set of practical tools for analysing the workings of the 'life worlds' of individuals through empirical investigations. These theoretical constructs offer the potential to frame a more robust and critical research agenda that is concerned with uncovering the way inequalities are reproduced and challenging educators and policy makers to bring about change.

4.4 Empirical tools for investigating primary students' ICT practices and literacy

This study was framed by Bourdieu's theory of practice together with Selwyn's further characterisation of technological capital to investigate primary students' school-based ICT literacy, while paying attention to contextual conditions, resources and relationships that work to shape their ICT practices. Table 6 details the application of the theory of practice, including technological capital (Selwyn, 2004), to primary students' ICT practices. This application draws attention to elements of habitus, capital and field to uncover objective conditions, resources and dispositions that presuppose ICT practice and possibilities.

Table 6. Theory of practice for investigating students' ICT practices and literacy

Home (field)	Technological capital*		Technological habitus
Objective conditions of the home environment including resources available, culture of technology contacts, uses, rules surrounding use and positions of family members in regard to technology within field within home	Economic	Material resourcing of students' home and school environments including quality, quantity of equipment and capacity for maintenance and upgrade of equipment.	Personal dispositions, preferences, practices and orientation toward the use of experiences with technology
	Cultural	*Embodied* Self interest in investing time into self-improvement of ICT skills Active participation in ICT education both formal (within school) and informal (outside of school) *Objectified* Socialisation into technology use and 'techno-culture' via techno-cultural goods (e.g. exposure to ICT via magazines, books and other media), family, peers and other agents of socialisation *Institutionalized* Formal (school) ICT learning	
	Social	Networks of 'technological contacts' and support. These can be face-to-face (including family, friends, neighbours, tutors and other 'significant others'; membership of groups/organisations) or remote (online help facilities and commercial help lines)	

* (Selwyn, 2004, p.355).

This guiding framework was applied conceptually, methodologically and analytically. A general description of this application is provided below, while specific details are discussed throughout this methodology chapter in the context of their application.

At a conceptual level the theoretical constructs were employed in the construction of the initial research object with the choice of a small-scale qualitative case study and guiding research questions. This design allowed for a consideration of the complexity of students' ICT practices and associated ICT literacy, including the interplay of factors and relationships within home, school and the broader social field of power. For Bourdieu, the research object is never analysed in isolation; instead, an objective representation should be constructed focusing on the systematic set of relationships

associated with participants, institutions and the broader social space (Hardy, 2012). In a Bourdieuian approach, the construction of the initial research object also required consideration of researcher's own objective position in the intellectual and academic field (Deer, 2012) (Section 4.5.2).

Methodologically, the theory of practice provided an empirical tool capable of detailing a dynamic representation of practice and developing an understanding of the interconnectedness between objective structures and personal lived experiences (Hardy, 2012). In this study, the guiding framework was embedded in the design of the data collection strategy and tools. Data was collected using four tools: a questionnaire, a school-based ICT literacy task, semi-structured interviews and blog activities; these were designed to capture a subjective representation of students' ICT practices and relationships. Each tool is included in Table 7 with reference to data focus and guiding theoretical construct (Further detail on data collection tools and strategy are provided in Section 6).

Table 7. Theoretical constructs and data collection tools

Data collection tool	Data focus	Theoretical construct(s)
Background questionnaire	Parental occupation data Available resources	Economic capital Field conditions
	Student practices and preferences – likes, dislikes, interests, weekly practices, self-efficacy	Habitus
	Student time investment	Habitus, embodied cultural capital
	Location of resources Family members' weekly practices Family members' time investment	Field conditions, objectified cultural capital and available social capital
ICT literacy task	School-based ICT literacy performance	Cultural capital (Institutionalized)
Semi-structured student reflective interviews	Explore and explain ICT literacy in relation to family practices Other questions	Habitus, objectified cultural capital, social capital and home field conditions
Blog activities	Family ICT practices and values	Field conditions, objectified cultural capital and available social capital

It is important to note that while the unique combination of methodologies were selected to capture students' ICT practices in the social and cultural contexts within which they occur, the research object defined by the researcher, focuses only on a segment of ICT practice. This study focuses specifically on students' home and school fields to understand their measureable ICT literacy. In defining the research object additional fields were considered, yet given the young age of participants and the limited fields in which they interact a focus on home and school was taken. Further, the focus of this study was detailing a deeper understanding of the ways that participants home ICT experiences structure school-based measures of ICT literacy, thus data collection tools were focused more closely on home fields than school. In addition, the data collection tools above, informed by the theory of practice to capture structures shaping ICT practice, are not to be considered as a complete representation of each theoretical construct. For example, habitus informed the design of data collection tools in terms of disposition or inclination towards ICT use, yet this is only one aspect of how Bourdieu defines habitus. Similarly, home and school fields were explored, yet it was not an intention of the research to cover all structuring field conditions rather varying details were offered by participants with data collection tools acting as guiding prompts.

Analytically, Bourdieu's constructs provide an opportunity for a layered analysis, initially at the individual construct level, followed by the construction of student profiles, allowing for analysis of the dynamic interrelationships between students and their home fields that result in practice. Finally, at a third level, analyses focused on positioning students' home fields in relation to the broader social field, which in this case was the field of education and school, in which formal ICT literacy is considered an essential attribute. To accomplish this, the differing ICT experiences of family groups were compared with a measure of school-based ICT literacy reflective of the immediate school context as a regular classroom task, and with the broader educational context in relation to ICT literacy and curriculum. This layered analysis produced a picture of students' ICT practice as a dynamic complex of interrelations, between individuals' disposition (habitus) and objective social structures (capital and field(s)). Ultimately, illustrating the differences that exist between participating students' experiences and orientation to technologies (and those of their families) and, importantly, the strategies they embodied that worked to constrain or enable school-based ICT literacy.

4.5 Role of the researcher

> *In choosing to study the social world in which we are involved, we are obliged to confront, in dramatized form as it were, a certain number of epistemological problems, all related to the question of the difference between practical knowledge and scholarly knowledge, and particularly to the special difficulties involved first in breaking with inside experience and then in reconstituting the knowledge which has been obtained by means of this break (Bourdieu, 1988, p. 1).*

4.5.1 Reflexivity

There is no perfectly transparent or neutral way to represent the physical or social world (Mills & Gale, 2007). One goal of reflexivity in qualitative research is to monitor such effects to enhance the credibility of the findings and accuracy of the research by accounting for researcher beliefs, values, knowledge and biases (Berger, 2013). For Bourdieu this view of reflexivity fell short, ignoring the limits of knowledge associated with the researcher's position in the field. To overcome this shortcoming he instead considered three types of bias that obscure the 'sociological gaze' of the researcher (Bourdieu & Wacquant, 1992).

- Social bias is concerned with the individual researcher's social origins and coordinates. This type of bias is the most commonly exercised form of reflexivity in qualitative inquiry. Bourdieu, however, considers this as only one form of bias, perhaps the most apparent, controlled by means of mutual and self-criticism (Wacquant, 1992).
- Academic bias is concerned with the position of the researcher in the academic field, the objective space of possible intellectual positions offered to the researcher in the field of power (Wacquant, 1992).
- Intellectualist bias is a form of bias that differentiates Bourdieu from other social researchers and is considered the binding strength across his body of work (Jenkins, 2002). In conceptualising this bias, Bourdieu focused on the researcher's occupation with reducing the world to a spectacle, ultimately risking reducing practical logic to theoretical logic (Bourdieu, 1990). This bias can be influential across conceptual, methodological and analytical operations of research requiring permanent sociological analysis and control of sociological

practice (Wacquant, 1992).

Bourdieu's epistemic reflexivity moves beyond narcissistically highlighting individual researcher's biases to uncover the collective unconscious embedded in intellectual practices structured by the objective relations of the intellectual field. The following section explains how each level of bias was addressed in this study, paying particular attention to intellectualist bias (Maton, 2003).

4.5.2 Three types of researcher bias

4.5.2.1 Social bias

The researcher's social biases were instrumental in the selection of research topic and data collection strategy, each of which is discussed as follows. The researcher has social origins in a working-class family structured by embodied left-wing trade-union views. A strong belief in the opportunities of public education and social mobility offered by the broader Australian society were reinforced within the researcher's disposition. This disposition, acquired in the earliest interactions of the researcher's life, remains critical in structuring the researcher's habitus. In this way, habitus was generative in the researcher's chosen discipline (education), topics (educational technologies, social inequalities, critical pedagogies) and theoretical and methodological orientations (Bourdieu, 2003). The transformative potential of Bourdieu's work in understanding structures and mechanisms that perpetrate inequalities, particularly in the field of education, were influential in the researcher's undergraduate studies and resulting practice as a teacher with a focus on providing a quality education for all regardless of background. As a doctoral candidate, the researcher was once again drawn to Bourdieu's concepts to understand inequalities in primary students' ICT literacy.

The researcher is situated in the broader field of education as a primary school teacher and a doctoral candidate. These positions are both competing and complementary, as each position is bound to a different field (primary school and higher education) with a different set of rules and values within the broader field of education. Importantly, the researcher worked as a part-time teacher at the research site. This positioning had important implications for the design, collection and analysis of student data. During the design of the study the researcher's knowledge and understanding of the school and

existing collegial relationship with staff and students at the site school assisted with the embedding of data collection tools into the class' regular work. It is acknowledged that this authentic integration may have otherwise been difficult as an outsider.

While implementing the data collection strategy, the researcher considered the influence of her existing teacher-student relationship with the participants by taking several measures to shift this traditional power relation:

- The researcher scheduled data collection episodes outside of the researcher's regular teaching days. Additionally, the researcher attended the Year 6 class for planned data collection episodes wearing casual attire (different to regular teaching attire) and left after the data collection episode to make a distinction between the two roles being undertaken within the site school.
- Data was collected in a team teaching situation (with the class teacher leading and the researcher supporting the lesson). This approach allowed lessons to follow a regular style of delivery that was typical of daily class interactions, while permitting the researcher to focus on data collection and, importantly, to take the time to listen instead of attending to classroom management and time issues.
- The researcher stressed to the participants from the outset the exploratory nature of the study, including the focus on student voice so that 'there was no such thing as a wrong answer', which was designed to encourage students to share. The researcher continually reinforced this position throughout the study period by reminding students before each phase of data collection.

While these steps were taken to shift the power relationship from teacher/student to researcher/participant, the researcher acknowledges that the power relationship could not be completely neutralised. During analysis, the researcher relied on several strategies to identify power relations, including peer review and the researcher's journal (detailed in Section 8 of this chapter).

4.5.2.2 Academic bias

Within the academic field the researcher is a PhD student in the very early stages of a career in academia. As a PhD student the researcher occupies a dominated position in a

field bound by rules and objective field conditions. At this early stage of the researcher's academic career, capital configuration is relatively small in comparison to the capital acquired in her position as a teacher in the field of school education. In this sense, the researcher's school habitus and way of knowing had a strong role in the construction of the research object, including the choice of research topic, the definition of the investigation's parameters and ongoing relational understanding and analysis of the field.

4.5.2.3 Intellectualist bias

The current state of play within the fields of education and educational research focus on documenting research-based evidence to improve educational outcomes. Governments and associated bodies advocate the critical importance of ICT in modern society to ensure competitive labour markets. This agenda is reflected in the investments, curriculum planning, large-scale assessment and research agenda of developed countries (ACARA, 2012b; MCEECDYA, 2010; MCEETYA, 2007; OECD, 2010). In Australia, this focus on producing digitally literate students is at the forefront of the research agenda at both school and tertiary levels. This focus has been demonstrated most recently in a school context with the introduction of the Australian curriculum's ICT capability and draft Digital Technologies learning area (ACARA, 2012a, 2013), along with the ongoing ICT literacy assessment at a national level (ACARA, 2012b). As an actor in both the school education and university fields the researcher followed this outcome-based focus to construct the research object with the view to: 1) understand the digital divide reflected in the data, and 2) assist teachers in better catering for the needs of all students to bridge this emerging divide. This 'way of knowing' unconsciously structured the researcher's pragmatic approach to the study through an initial desire to 'simply address' the problem.

As a PhD student, the researcher's engagement in the academic field with educational technology research uncovered competing agendas within the field. With a large body of educational technology research producing 'applied' academic evaluations concerned with developing more efficient ways of 'doing technology' (Selwyn, 2014, p. 3), compared with a smaller body of critical research that pays attention to the complex, socially embedded nature of ICT practices and what this might mean for technology and

education. The first type of research fits well with pressing government and curriculum agendas and the researcher's position in the field as a teacher. However, understanding this misrecognition, through the data itself, strengthened the researcher's affinity to Bourdieu's concepts and commitment to a theoretically grounded critical approach. This illustrated a shift in the researcher's motivation from providing a solution to highlighting voices and complexities of practice that illustrated the messy realities of young people's ICT practices and associated inequalities. It is important to note here that while applying a critical stance the researcher still sought to make practical suggestions in an attempt to offer insights and advance understanding from which solutions might be developed and evaluated in the future.

5 Context of the study

5.1 Ethical procedures

Prior to the commencement of data collection, a Human Research Ethics application was submitted for review to the University of Wollongong's Human Research Ethics Committee detailing the purpose of the study, the intended recruitment of the participants and the confidentiality of the data. This application was approved on 28th April 2011 (HE11-115, Appendix B). An application was also submitted to the New South Wales Department of Education and Communities to conduct research in a NSW public school. This application was approved 13 July 2011 (SERAP 2011066, Appendix C). Upon approval, the principal of the site school was approached and a class case was identified.

Informed consent was obtained from the classroom teacher, the students and the parents of all students within participating classrooms. An information sheet (Appendix D) was provided and the researcher discussed the nature and purpose of the study, along with intended research activities, with the school principal, class teacher and participating students. Ethical considerations were also discussed, including:

- Treatment of data collected – participants were advised that data collected would be stored and accessible only by the researchers for a period of five years from collection.

- Confidentiality of information – participants were advised that their identities would be protected and that pseudonyms would be used in any publications arising from the study.
- Voluntary participation – participants were advised that they were free to withdraw at anytime from the study, that this would not result in penalty and that participation or non-participation would not affect their normal classroom learning experiences.
- Informed consent – the researcher collected the signed informed-consent forms from all participating students and their parents along with the participating class teacher.

5.2 Participants and site

Primary school students were selected as the participants in this study, as the research was focused on their use and experiences with ICT. While there has been much interest in education and technology with research measuring primary students' ICT literacy and other studies exploring factors contributing to the digital divide, little work has been conducted exploring primary students' school-based ICT literacy together with their family backgrounds and ICT experiences.

The 25 participants in this study came from one upper primary class (Year 6) of 28 students (aged between 11-13 years) in a regional public school in New South Wales. Year 6 students were targeted for this study, as they are a focus group for sampling in Australia's National Assessment program for ICT. In selecting a case, careful consideration must be taken to maximise access to collect case study evidence (Stake, 2000; Yin, 2003). Specifically, a Year 6 class within a local primary school was purposively selected due to the mix of family backgrounds and the researcher's working relationship with the school.

The school's total enrolment from K-6 at the time of the study was approximately 500 children. The school's Index of Community Socio-Educational Advantage (ICSEA) value was 1,010, 10 points above the average value of 1000 (ACARA, 2010). ICSEA is a measure of educational advantage that acknowledges parent occupation, level of

completed education and educational achievement. A value on the scale assigned to a school is the averaged level for all students within that particular school. ICSEA was developed for the Australian governments' My School website (http://www.myschool.edu.au) to enable comparisons of performance in a given school with that of similar schools serving students with similar backgrounds (ACARA, 2014). A value of 1,010 for this school indicated that the school demographic was close to the Australian average. However, an interesting characteristic of the school is the diverse mix of student backgrounds. For example, the number of students from the bottom quarter of disadvantaged backgrounds was 5% higher than the Australian average distribution (ACARA, 2010). This diverse mix was a result of the proximity of the school to a large public housing estate on the lower side of the escarpment and a new housing estate on the higher side of the escarpment.

In terms of technology, the school was well resourced, with all classrooms and learning support rooms fitted with an interactive whiteboard and networked computer. Teachers and students also had access to two dedicated computer rooms, one of which held 16 networked desktop computers and the other 31. Both computer rooms also had a dedicated data projector. The teachers ranged in age and experience from graduate recruits to those nearing retirement. The school leadership valued, promoted and supported ICT for teaching and learning. There was also strong interest across the range of teachers in integrating ICT into the classroom because of targeted ongoing professional learning programs initiated and funded solely by the school. The dedicated focus on ICT for teaching and learning through teacher professional learning and available resources were unique characteristics of the school compared to other primary schools in the region.

Once the school had been selected as a site, the researcher purposively selected a Year 6 class. Purposive sampling is based on the supposition that the researcher wants to uncover, comprehend and gain insight, and thus must select a sample from which the most can be learned (Merriam, 1998, p. 61). The class was selected as the case due to the mix of family backgrounds anecdotally noted by the main class teacher, and the researcher's existing relationship with the main class teacher and class, as she taught the class two days a week in a job-share position with the main class teacher. The key characteristics of the case included:

- Two experienced class teachers with a strong interest in ICT for teaching and learning (part-time job-share arrangement)
- Students were representative of typical Year 6 children including variation in academic ability, interests and motivations
- Technology embedded in learning programs through daily interactions with class and school technology tools
- Classroom resourced with interactive whiteboard and five classroom computers
- Students had access to school computer lab once a week
- Established relationship with students and understanding of the environment
- Established relationship with teacher, allowing for collaborative planning and authentic integration of unit of work

Twenty-five students from the class of 28 consented to participate in the study. All consenting students in the case participated in Phases 1 and 3 of the study. Participating students came from a variety of family backgrounds within the case. As the data collection strategy during Phase 1 and 3 was embedded into regular class work, all students in the class participated in learning and assessment activities, but only data from the 25 consenting participants was collected. Six students were then selected to participate in Phase 2 of the study, consisting of a semi-structured reflective interview. This selection was based on preliminary analysis of Phase 1 data sources (questionnaire and ICT literacy task) to represent maximum variation along with student availability. Three high-performing, two mid-performing and one low-performing student from a variety of family backgrounds were selected to represent multiple perspectives in skill within the case. The selection of students based on variation in performance (processes and scores) and availability (a number of students were absent from class activities due to a number of extra-curricular school activities coinciding with data collection period) resulted in an uneven distribution between family backgrounds and the inclusion of two participants from non-professional families whose performance was not typical of patterns of performance associated with large scale assessments of ICT literacy. Additionally, the six students selected to participate were considered articulate children, however this ability was typical of their age group.

A limitation of the purposive sample is that the sample is selected to identify information rich cases rather than representing the whole population. While the goal is

not generalisation, it is important that the researcher highlight the sampling strategy and its associated logic (Mertens, 2005). Further, it is important that such a study provides thick description about the students and their contexts so that the reader is able to subjectively generalise from the case in question to their own personal experiences (Stake, 2000).

6 Data collection

The study was conducted across three phases. Each phase of the study was embedded in the class context, through integration into students' normal class work, to permit collection of data within a naturalistic environment. The data collection strategy was designed to obtain multiple complementary sets of data, resulting in rich, complex descriptions of students in situ. This strategy guided by the qualitative embedded case design along with theoretical underpinnings offers a new understanding of students' school-based ICT literacy through the novel combination of methodologies including: ICT literacy task, reflective interviews based on ICT task performance, background questionnaires and blogging activities, to explore the factors contributing to ICT literacy performance. Bourdieu himself highlighted the significance for sociological work to "mobilize all techniques that are relevant and practically useable, given the definition of the object and the practical conditions of data collection" (Bourdieu & Wacquant, 1992, p. 227). Data was collected across three phases, using four tools –a questionnaire, an ICT literacy task, semi-structured reflective interviews and blog activities – that were designed to capture an objective representation of students ICT practices and relationships. Figure 2 illustrates an overview of the data collection methods, and is followed by details of the data collection procedure and a description of each phase, including data collection tools, data focus and underpinning theoretical constructs.

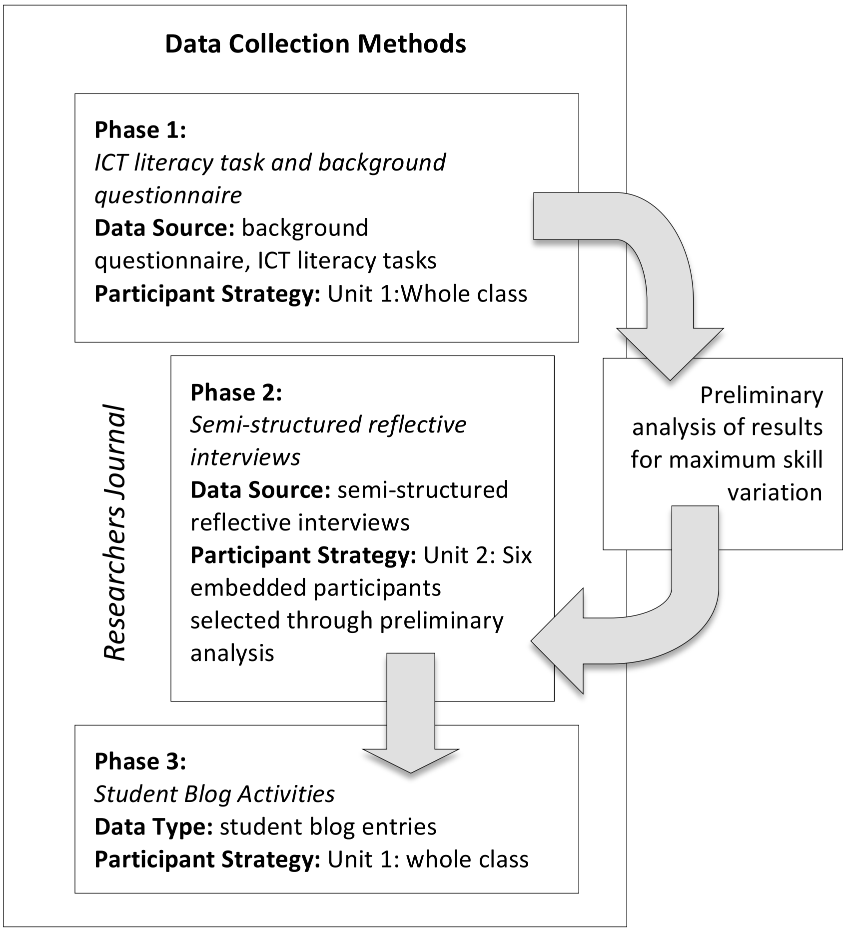

Figure 2. Overview of data collection methods

Data collection occurred throughout the third school term as negotiated with the class teacher, outlined in Table 8. The researcher was present throughout this term during a number of other related learning experiences exploring the role of ICT in students' lives that had been designed by the class teacher, but for which no data was collected.

Table 8. Data collection schedule

Data collection procedure	**Time period**	**Term 3 collection date**
Information and consent distribution	30 min	Week 4 Tuesday
Questionnaire	60 min lesson 1 homework task – 20min follow up	Week 5 Wednesday Week 6 Monday
ICT literacy task	90 min	Week 7 Monday
Interviews	6 interviews @ 30min each	Week 7 Tuesday
Blog activities	5 formal lessons @ 60 min each 3-4 homework tasks	Weeks 6-10

During Phases 1 and 3, data was collected from all participating students. However only six students participated in Phase 2 semi-structured reflective interviews. Details of data collected from students across the phases of the study is summarised in Table 9. (Pseudonyms have been used in place of the students' real names.)

Table 9. Summary of data collected from students

	Questionnaire				**Blog Activities**		
Student	**All About Me**	**About My Family**	**ICT task**	**Intervi ew**	**Post 1**	**Post 2**	**Post 3**
Chantele	x	x	x		x	x	
Darcy*	x	x	x	x	x	x	x
Karen	x	x	x		x	x	x
Bonnie	x	x	x		x	x	x
Emma*	x	x	x	x	x	x	x
Deanne	x	x			x	x	x
Jennifer	x	x	x		x	x	
Kara	x	x	x		x	x	x
Lisa	x	x	x		x	x	x
Kylie	x	x	x				
Georgie	x		x		x	x	x
Carly*	x	x	x	x	x	x	x
John	x	x	x		x	x	x
Adam*	x	x	x	x	x	x	x
Mike	x	x	x		x	x	x
Harry	x	x	x		x	x	x
Joseph	x	x	x		x	x	x
Cal	x	x	x		x	x	x
James	x	x	x		x		
Mac	x	x	x		x	x	x
Aaron*	x	x	x	x	x	x	x
~~David~~	~~x~~		~~x~~		~~x~~	~~x~~	
Malcolm	x	x	x		x	x	x
Lucas	x	x			x	x	x
Hamish*	x	x	x	x	x	x	x
	25	23	22	6	24	22	20

*embedded unit of analysis

No adaptations were made to the methodology throughout the period of data collection. Thus, a full data set across each data source was not collected due to low attendance towards the end of the term and a number of extracurricular activities occurring within the broader school context. This was taken into consideration when planning analysis; as a result, data sources were considered individually, and when the sources were converged students without a full data set were removed from analysis. The following

paragraph details the data handling and analysis strategy for each of the results papers and chapter within this study.

Chapter Four reports on questionnaire data that was completed in two parts. All 25 participants completed Side A, All About Me, and 24 completed Side B, About My Family. The participant who did not complete Side B, David, was excluded from analysis and discussion; as a result Chapter Four presents results from 24 participants. Chapter Five reports on the ICT task data and parental occupation data from the background questionnaire. Of the 23 students who participated in the ICT task described in this chapter, one student, David, did not complete the questionnaire and was excluded from analysis. Thus Chapter Five presents results from 22 participants. Chapters Six and Seven focus on the six embedded units of analysis (Darcy, Emma, Carly, Adam, Aaron and Hamish), for whom a complete data set was collected.

6.1 Phase 1

The purpose of Phase 1 was to provide data about students' background including family ICT practices and parental occupation data, along with a school-based measure of each participant's ICT literacy. This data was used to compare students' home ICT experiences and school-based literacy individually and within the case. The data was also used in the initial development of student technology profiles, which were then used to purposively sample six students to participate in Phase 2 of the study.

6.1.1 Background questionnaire

The aim of the background questionnaire (Appendix E) was to provide information on the students' age, gender and socioeconomic status (in terms of parent's occupation), and their personal use of and engagement and familiarity with ICT. In terms of information about students' and their parents' ICT use within the family home (field), to better understand their personal dispositions (habitus) and available resources (capital) the questionnaire focused on the following questions:

- What types of technology do the students have access to in their home environment?
- Where are technologies located in the students' home?

- Who are the users of technology in students' home/family?
- How often do the students and their families are using technology?
- For what purpose do students and their families use technologies?

The questionnaire was first piloted with a different Year 6 class at the site school to test questionnaire items, design and delivery. The pilot was an important stage in the design of the questionnaire and lesson plan, allowing the researcher to test students understanding and the validity of the tool. Following the pilot, questionnaires were refined and then introduced to case students in a formal lesson exploring technology in their lives designed as part of their regular classroom program addressing Australian Year 6 Human Society and Its Environment (HSIE) and Science & Technology syllabus outcomes (Appendix F). The lesson was delivered by the researcher and class teacher in a team teaching situation and was sequenced as follows. First, students were involved in a brainstorming activity where they listed all the ways that they use ICTs. They were then asked to think about all the different ways they use computers and the Internet, after which the researcher and teacher talked through the questionnaire with the class to ensure all students understood the questionnaire. The questionnaire itself took the form of an in-class collectable worksheet activity and homework task. There were two parts to the questionnaire, each part presented on one A4 sized paper worksheet. Side A, All About Me, was completed in class. The questionnaires were then sent home so that students could discuss the technology in their lives and complete side B, About My Family, with their families as part of their weekly homework task, allowing student data to be member checked by their family members for establishing credibility. Member checking allows data to be cross-checked or reviewed by participants and stakeholders (Lincoln & Guba, 1985).

6.1.2 ICT literacy task

The aim of the ICT task was to measure students' ICT literacy, focusing on the six key processes of ICT literacy used in the Australian National Assessment Program of ICT literacy: accessing information, managing information, evaluating, developing new understandings, communicating with others and using ICT appropriately (MCEETYA, 2007). The ICT task designed for this study was integrated into the class' existing unit of work, was open ended and used live software applications including Microsoft Word and web browsers on desktop computers (Appendix G).

The ICT task was designed to follow the same structure as the larger modules used by the Ministerial Council for Education, Early Childhood Development and Youth Affairs [MCEECDYA] National Assessment Program – ICT Literacy Years 6. Thus, the ICT literacy task used in this study followed the same 'linear narrative sequence designed to reflect students' typical 'real world' use of ICT' (ACARA, 2012). This approach was taken as it was a focus of this study to conduct a qualitative exploration of Australian school students ICT literacy, given the diversity in performance captured by the National Assessment program over the last decade. The content focus of the task was devised to fit in with the class' existing unit of work on government, was called Design a Flag. Design a Flag required students to collect information about flags and symbolism, synthesise this information into short summaries, create a flag to symbolise Australia and justify their design. The ICT task comprised 11 sub-tasks separated into two parts: Part A: Working with information and using ICT responsibly, and Part B: Creating and sharing information. During Part A students were required to collect information from two multi-modal web sources that were provided to them, and find an additional source of their own. The first given source was a multi-modal website designed for primary students, which consisted of a combination of pictures and small chunks of texts. The second given source included a larger body of text and, whilst it was comprehensible for the target age group, it was not specifically designed for primary students. The website featured a number of internal links including commercial links in the middle of the main body of text and did not include any images. Students were then required to select their own web source to obtain additional information that could be used in a short report about flags. Next, students were asked to write a short justification of their chosen source and synthesis the information they had collected. Students used Microsoft Word to word-process this information. Part B required students to access a learning object that allowed them to design and create a flag. When students had completed this activity and imported their flags into a Word document, they were asked to describe and justify their flag design, making links to their synthesis in Part A. Each step within the ICT task was linked to an ICT literacy strand and key process of ICT literacy, detailed in Table 10.

Table 10. Design a flag - ICT literacy task summary

	Task	ICT literacy process*	Description
Part A: Working with information*	1. Getting started	Accessing information Managing information	Follow a set of simple instructions to access the ICT task web page, open a Word document, organise document structure and save/store the file in correct location with the appropriate file name for retrieval and reuse.
	2. Flag facts	Accessing information Evaluating	Use links to navigate to a website to compile a list of important facts within the Word document. Identify and retrieve information from the chosen source while making judgements regarding the relevance and usefulness of the information to their needs.
	3. Selecting a source	Accessing information Evaluating	Use a search engine to select an appropriate website to add additional information to the list of facts.
	4. Locate appropriate information	Developing new understandings	Access information from the selected source, adding at least three relevant and useful facts, checking for relevance, paraphrasing and editing for logic and sequence.
	5. Justify source choice	Evaluating Using ICT appropriately Communicating with others	Include URL and detail why the chosen source is appropriate. Make judgements regarding the integrity, relevance and usefulness of information.
Part B: Creating and sharing*	6. Write a short report	Developing new understandings Communicating with others	Use information to synthesise a short flag report, creating new information and knowledge by synthesising, adapting or authoring to suit audience, context and medium.
	7. Functional task: learning object	Accessing information	Open the learning object and complete the activity.
	8. Functional task: screen shot	Accessing information	Take a screen shot of the flag image.
	9. Functional task: import image	Accessing information	Import the image into the Word document.
	10. Describe and justify flag design	Developing new understandings Communicating with others	Describe and justify the flag design using concepts from tasks 1-3. Reframe and expand existing information to create an information text to suit audience, context and medium.
	11. Formatting	Managing information Communicating with others	Format headings, font, style and size to reflect structure and consistency.

* Processes and strands defined in the Australian National Assessment Program of ICT Literacy (MCEETYA, 2007)

The ICT task was made available to students as a website, hosted on the school intranet. The site featured three pages, step-by-step instructions, links to external information sources and a pre-existing learning object (The Learning Federation [TLF], 2009) that students completed as a component of the broader task (Appendix G). The task difficulty was aligned with the class teacher's formative-assessment records and benchmarked progress levels (a hierarchy of what students typically know and can do) from the Australian National Assessment Program conducted in 2008 (MCEECDYA, 2010).

The ICT task was initially designed by the researcher, in terms of ICT processes and functions, and then customised to fit curriculum outcomes and integrated as part of the regular class unit of work through consultation with the class teacher. It is important to note that while the content focus of the task was flexible, the key processes remained the same; for example, the task could easily be redesigned to explore a different content area while following the same processes. This was a key consideration in the design of the ICT task itself, allowing the processes of ICT literacy to be a focus rather than the cognitive demands of new content. In this case the students had been developing their own countries using an assigned model of government (e.g. dictatorship, democracy or monarchy), and part of this larger task had been to develop a flag for their nation, so they had some previous learning experiences focusing on flags and symbolism.

The ICT task was delivered during a two-hour morning session in the school's computer lab. A lesson plan was developed to assist the smooth running of the task in a timely manner for both the class teacher and researcher (Appendix H). Data was collected from each student in the form of a final printed task and a Microsoft Word file, along with a movie file of the students' actions during the designated task period, created using screen recording software (Debut). The artefact produced during the task, both printed and Word file copies, were collected for scoring and analysis along with the screen recordings of students' processes throughout the two-hour task. This rich data was collected to gain a deep understanding of students' technology use together with their school-based ICT literacy.

6.2 Phase 2

Phase 2 consisted of semi-structured reflective interviews, during which six embedded participants reflected on their digitally recorded ICT literacy task performance. Interviews occurred the day after the ICT literacy task; the immediate scheduling of reflective interviews was a central consideration in the project timeline as it was methodologically important to ensure that the interviews immediately followed the ICT literacy task. This is recommended to ensure that the event remains clear in the participant's mind (Henderson & Tallman, 2006).

6.2.1 Semi-structured reflective interviews

The aim of the semi-structured student reflective interviews was to provide a deeper understanding of a students' level of engagement with the computer, computer software and the Internet, while completing the ICT literacy task. Six students were invited to participate in the reflective interviews. Selection was based on preliminary analysis of Phase 1 data sources, which occurred immediately following the collection of both sources to allow for the close scheduling of interviews. Students were selected to represent high, mid and low performance. Focusing on variation in results during preliminary analysis allowed the researcher to present multiple perspectives from individuals to illustrate the varying complexities of students' ICT proficiency, a maximum variation sampling strategy (Creswell, 2007).

The semi-structured interviews incorporated playback of the students' recorded ICT task from Phase 1 of the study. The recorded ICT task was played back on the researcher's laptop with the purpose of guiding dialogue about student knowledge, skill level and thought processes during the task period. This guided recall approach preserves the emphasis on eliciting feelings, perceptions and thick descriptions of experience (Mayes, 2006). Student descriptions of experience ascertained during guided recall helped the researcher understand how students were actually using technology in relation to their ICT literacy skills, as well as how, where and why these skills may or may not have been developed. This guided recall interview technique, where an artefact is used to initiate and guide dialogue, has been trialled and used successfully with children as part of learner experience in an e-Learning project in Glasgow (Mayes, 2006). The use of the video provides a visual and aural stimulus because it is a

documentation of the participant 'in action'. This is particularly helpful when working with students because it can trigger memory cues of their participation in a recorded event (Edward-Leis, 2006).

All interviews followed a brief semi-structured protocol (Appendix I). This approach provides a quality assurance measure that reduces the influence of the interviewer, as well as ensuring consistency during qualitative interviews (Greig, Taylor, & MacKay, 2007). The recorded task itself also guided the interview, with allocated time at the end of the recorded task for general interview questions and open discussion. Student interviews were conducted one day after the ICT task to ensure participation remained clear in students' minds. As there is "greater likelihood of plausible, schematic and/or causal-inferential gap- filling errors, the longer the timeframe between the event and the recall" (Henderson, Henderson, Grant, & Huang, 2010, p.9). Interviews were conducted throughout the school day in classroom mini-lab and ran for approximately 30-40 minutes each. All interviews were digitally recorded and transcribed, with the transcript representing the data for analysis. This rich data was collected together with digitally recorded ICT tasks to provide a deep understanding from the students' perspective of school-based ICT literacy practices and how such practices were acquired, instead of reducing such a complex social practice to a simple score.

6.3 Phase 3

6.3.1 Student blog activities

The aim of the student blog activities was to have students explore their own home technology environments, with a focus on interviewing their own available technological contacts. It is important to collect data directly from children using techniques that acknowledge that children provide relevant and valid information (Downes, 1999). The design of the class blog activities was informed by Bourdieu's theory of practice. This data provided data about participants' habitus, field and available 'technological capital' to better understand participating students' technology use and ICT literacy.

The blog activities (Appendix J) were designed in collaboration with the class teacher to meet typical Year 6 HSIE and Science & Technology syllabus outcomes and integrated into the class' regular work. In this way the data collection strategy was embedded into the class learning context, allowing for meaningful and authentic student participation. Authentic participation involves immersing people in the focus of the enquiry and the research method, involving them in data collection and analysis (Greig et al., 2007). While participating in the blog activities, students conducted interviews with family members about their technology use and recorded these interviews in their blog to share with the researcher. The learning experiences are outlined in Table 11.

Table 11. Blog activities

Learning experience	**Location**	**Focus**
Blogging – About Me	Computer lab	Introduce students to blog and features. Students write introductory post – 'About Me'.
Technology map		Students create a user key on their technology map detailing technology users and corresponding technologies used within the home.
Family technology interviews	Homework task(s)	Students interview family members about the technology they use daily, the purpose of their use, what they think about technologies and what the technologies mean in their lives.
Blogging – sharing interviews	Home/ computer lab	Students write family technology interview posts in personal blog.

A blog was chosen as the most appropriate medium to collect this data, as it as accessible at both home and school and was a common space for documenting and storing information/data. Student blog activities ran over a six-week period across Term 4. All lessons were taught in a team teaching arrangement with the class teacher and the researcher. Students conducted technology interviews as part of their weekly homework task for a total of four weeks. Blog activities were integrated in this way because the teacher's regular class program usually included an inquiry based homework task linked to the students' class work. A total of three blog posts were assigned and collected. The first post focused on the students' own ICT practices. For the second post, the students shared their family technology interviews with parents and caregivers. For the third post, students shared their family technology interviews with siblings.

6.4 Researcher's journal

Throughout this study the researcher kept a journal of events and direct observations during field visits to the research sites. Yin (1994) explains that "assuming the phenomena of interest are not purely historical, some relevant behaviours or environmental conditions will be available for observations" (p. 86). The researcher's journal played an important role in allowing consistent sociological analysis across the course of the project. Journal entries taken during data collection were reviewed daily and alongside analysis allowing the researcher to better understand the ongoing objectifying relation between the researcher and the object (Maton, 2003).

7 Data analysis

The data from the questionnaire, ICT task, interviews and blog entries were thematically coded at an individual source level and then according to Bourdieu's theory of practice or the processes of ICT literacy, as detailed below (Sections 7.1 to 7.5). Following this first level of analysis, summary reports for each data source were compiled, which were then triangulated at multiple stages to provide rich contextual details of ICT literacy and practice. This strategy was appropriate for the embedded case design, as triangulation of sources at a number of stages allows the production of rich contextual accounts that confirm the emerging evidence (Merriam, 1998). Table 12 illustrates how data was analysed in relation to the theoretical framework and research questions. An analysis plan was also created and edited throughout this process to keep a record of the detailed and layered analysis required with multiple qualitative data sources (Appendix K).

Table 12. Data analysis in relation to the theoretical framework and research questions

Research questions	Data	Relationship to theoretical framework and processes of ICT literacy
How do Year 6 primary school students perform in terms of their school-based ICT literacy practices?	Phase 1: ICT literacy task	ICT literacy (scoring rubric – Appendix N) Students' ability to access, manage, evaluate, synthesise, communicate and use ICT appropriately (MCEETYA, 2007)
How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?	Phase 1: Questionnaire Phase 2: Interview Phase 3: Student blog entries	Economic capital Home (outside of school) ICT - access versus effective access Parental education level and position
	Phase 1: Questionnaire Phase 2: Interview Phase 3: Student blog entries	Cultural capital Access to techno-cultural goods Family and friends – use and purpose for use of technologies
	Phase 2: Interview Phase 3: Student blog entries	Social capital Networks and technological contacts
What is the relationship between a Year 6 primary school student's family background and their school-based ICT literacy practices?	Phase One: ICT literacy task Phase Two: Interview Phase Three: Student blog entries	ICT literacy Students' ability to access, manage, evaluate, synthesise, communicate and use ICT appropriately (MCEETYA, 2007)
		Technological capital (Selwyn, 2004) The role of technological capital in relation to ICT literacy proficiency – data collected to address question 1

7.1 Questionnaire

Student questionnaires were inductively analysed two ways. The first level of analysis focused on the topics and themes that emerged within the case. The data was coded inductively to, first, recognise these major topics and themes and then to determine their frequency (Appendix L). The second level of data analysis focused on comparing topics

and themes with subsets of groups within the case, including gender groups, differing family background groups paying attention to practices and preferences indicative of habitus and technological capital. Once sub-groups had been established, student responses were compared across and between professional family groups and non-professional families. Finally, a summary report was compiled. This layered analysis was critical in allowing an exploration of the relationship between socioeconomic background and ICT related practices from a qualitative perspective capable of in-depth investigation and rich description (Appendix K).

In terms of family background, student responses were first examined using the single level indicator of parental occupation. While there is agreement on the significance of socioeconomic status in educational research, there is little agreement on its conceptualisation and measurement. Individuals' level of education and employment status are both standard measures of socioeconomic status broadly accepted in the community (Australian Bureau of Statistics [ABS], 2011). While there is no single correct measure of socioeconomic status, the Australian Standard Classification of Occupations (ASCO) schema (Castles, 1986) has been used in government and academic research in Australia since the mid-1980s (Marks, 1999). The ASCO schema was selected for the purposes of this study based on the single level indicator of parental occupation being available to the researcher. While both educational levels and occupation were initially of interest to the researcher, ethical consideration was given to students' age and their knowledge about their parents' background; thus a single level indicator of occupation was selected as the most accessible and appropriate data type. The occupations of students' parents were initially classified according to the Australian Standard Classification of Occupations (ASCO) schema. The single level indicator of highest status occupation within the home based on the ASCO schema was used to determine occupation categories. The researcher then organised these major groups into broader parent occupation groups of professional occupations and non-professional occupations (Table 13).

Table 13. ASCO major groups (adapted into professional and non-professional occupation groups)

PROFESSIONAL BACKGROUND	1. Managers and Administrators
	2. Professionals
	3. Associate Professionals
NON-PROFESSIONAL BACKGROUND	4. Tradespersons and Related Workers
	5. Advanced Clerical and Service Workers
	6. Intermediate Clerical, Sales and Service Workers
	7. Intermediate Production and Transport Workers
	8. Elementary Clerical, Sales and Service Workers
	9. Labourers and Related Workers

7.2 ICT task

7.2.1 Preliminary analysis

Initially ICT tasks underwent a preliminary level of analysis to select embedded case students to participate in reflective interviews. The criteria for selection were to represent variation in performance as well as an equal number of girls and boys. This analysis had to occur immediately following the ICT literacy task so the interviews could be conducted the following morning. The class teacher and researcher reviewed student artefacts immediately following the ICT literacy task and identified a number of students representing varied results, based on the teacher's judgement. Following this initial review, the researcher scored each student's digitally captured performance, and six students were selected to participate in semi-structured reflective interviews. Brief details of student practices during the ICT literacy task were noted and added to the semi-structured interview protocols to guide and focus reflection in a meaningful way (Appendix M). The inclusion of semi-structured interview protocols during recall is beneficial as primary students can require a variety of cues and stimuli to relive the original situation (Edward-Leis, 2006).

7.2.2 Task scoring

ICT tasks were scored against a criteria based rubric (Appendix N) using the final products and digitally captured task data. The marking rubric was designed similarly to NAP ICT assessment guide exemplars (ACARA, 2011). In completing the ICT literacy task students completed 11 sub-tasks that were assigned descriptors, marking scales and maximum scores. The final task was worth 23 possible points.

Student tasks were scored using the final printed work artefact and the digitally captured task, allowing both the final product and the process to be assessed. The marking rubric was piloted on three tasks, after which changes were made to marking scales, total score and number of descriptors to allow more detailed differentiation between student work. This process occurred with the class teacher drawing on knowledge of assessment, curriculum, the ICT proficiency scales (ACARA, 2012) and students' actual practice, to ensure the rubric was reflective of the possible approaches students might take in completing the task. The rubric was then reformatted to include a space for the researcher to record the processes that students undertook while completing each sub-task. Tasks were marked twice, initially with the class teacher using the first scoring rubric (Appendix N), followed by a second marking during which the researcher noted down the recorded processes against task marks using the revised rubric (see example student rubric Appendix O).

After all students' tasks had been marked, scores were compared using averages and highest and lowest scores for the whole group, family background groups and gender groups. Scores for each question were then compared across the whole group, family groups and gender groups. A summary of results was compiled. In addition, analysis of ICT task processes beyond the marking rubric including student behaviour (e.g. number of sources viewed/used, search terms and strategies, efficiency, paraphrasing, copying and synthesising) was tabulated for comparison between all students and student groups. This data was summarised and compiled to enrich task achievement data.

7.3 Interviews

Student interview data was transcribed and analysed inductively and then deductively using the six process of ICT literacy along with the study's guiding theoretical

constructs. The data was coded inductively first to recognise emerging patterns, major topics and themes and then deductively in terms of ICT literacy and each theoretical constructand then to determine the frequency of these themes. Where necessary, interview data was analysed with the corresponding section of the ICT literacy task to ensure clear interpretation. Emerging themes from the interview data included: the interplay of processes of ICT literacy, functionality issues that presuppose ICT literacy processes, students' technological capital, home field conditions and personal dispositions in shaping ICT literacy practice. Major themes were then summarised for each interview and combined with existing technology profiles to create in-depth technology profiles for the six embedded units of analysis (Appendix P contains a sample profile). According to Merriam (1998), triangulation requires using multiple sources of data to pool judgements and confirm the emerging findings. This strategy allowed for holistic comparison of students' ICT literacy experiences at home as well as at school, available capital and dispositions to construct plausible explanations about how and why variations in students' school-based ICT literacy occur in practice.

7.4 Blog activities

The blog activity data was rich and in-depth, requiring several layers of constant comparative analysis (Merriam, 1998). Student blogs posts were first transferred into Word documents and then moved into Excel for analysis. Blog entries were analysed across family members and at family level for emerging patterns and theoretical constructs. Analysis of family units was then conducted focusing on patterns of family practice and views of ICT. Family group data tabulated in a spreadsheet and summarised to provide descriptive accounts of family practice (purpose and use) and view (family ICT habitus). Comparisons between family groups' practices and views were then made. In general, three types of views about ICT in society and family life emerged: positive, negative and cautionary. These categories were not mutually exclusive.

This data was then converged with questionnaire data to allow the compilation of descriptive family practice summaries for all students. These summaries were then considered against the theoretical constructs to uncover structure and agency within individual families and family groups that worked to shape practice. Finally, this

analysis was summarised and added to embedded participants' technology profiles (Appendix P).

7.5 Compilation of data sources

7.5.1 Technology profiles

As discussed above, data sources were triangulated to build technology profiles. This data was converged for both of the study's units of analysis:

- Unit 1 (whole-class level) – Questionnaire and ICT literacy task data were converged to create basic technology profiles that detailed student ICT literacy task performance together with parental occupation data. This allowed analysis of ICT literacy task performance based on parental occupation groups. Blog task data was then added to basic profiles
- Unit 2 (six embedded participants) – Interview data was converged with basic technology profiles of the six embedded participants. This allowed for a contextual analysis of each participant's school-based ICT literacy. This was followed by the addition of blog task data, which allowed the students' ICT experiences to be characterised using the theory of practice (detailed below in Section 7.5.2).

The creation of technology profiles assisted in the confirmation of emerging findings and revealed a deeper understanding of participants' school-based ICT literacy in the context of their ICT experiences. Overall, building student technology profiles allowed a holistic level of comparison between ICT literacy, student background and research questions.

7.5.2 Embedded participant narratives

Paying attention to the profiles of the six embedded participants, technology profile data was organised according to theoretical constructs for analysis (Appendix Q) to uncover patterns of practice and establish conceptual congruence (Merriam, 1998). This process allowed the creation of ICT experience narratives for the six embedded participants. Narratives were systematically structured according to the theoretical framework detailed Table 14 with reference to original data sources.

Table 14. Narrative structure for embedded participants

Guiding theoretical construct	Details	Original data source
Economic capital	Family background. Parent occupation	Questionnaire
Field	Number of and relationships of people living in family home Location of technology use	Questionnaire Blog
Doxic practices	Family technology practices = culture	Questionnaire Interview Blog
Habitus	Student – Likes/dislikes, Favourite/least favourite Family – likes/dislikes Timetabled technology use	Questionnaire Interview Blog
Social capital/cultural capital	Support person(s) Support person(s) practices Learnt to use computer	Questionnaire Interview Blog
Symbolic capital	ICT literacy	ICT literacy task
Habitus	ICT view	Interview Blog

The compilation of detailed these student narratives allowed for further comparison and consideration of embedded participants' practices across three levels of deductive field analysis including:

- Mapping the objective structure of relations between the positions occupied by agents who compete for legitimate forms of specific authority of which the field is a site;
- Analysing the habitus of agents; the systems of dispositions they have acquired by internalising social and economic condition; and
- Analysing the position of the field vis-à-vis the field of power (Grenfell, 2012, p. 221).

Family technological capital accumulation and structure of relations were analysed for each family at the level of the individual student. Then capital accumulation and the structure of relations were compared across families, including parental occupation sub-groups. Following this, individual student habitus was analysed through data reflecting disposition and interest, along with available capital and ICT literacy.

Finally and once again, at an individual student level, student families were positioned within the broader field of power according to parental occupation groups and comparisons made. Following this analysis, these rich narratives allowed further consideration of social reproduction and transformation to uncover conditions that worked to enable or constrain formal ICT literacy practices.

8 Quality of the study

When conducting any variation of case study research there are a number of considerations in terms of the trustworthiness and credibility of the data. The study used a number of verification methods to enhance the quality of the study, including prolonged engagement, triangulation, peer examination, clarifying researcher bias, member checks, thick description and analytic generalisation. These are summarised in Table 15 below.

Table 15. Verification methods used in this study

Procedure	Application to this study
Prolonged engagement Prolonged engagement in the field decreases the novelty of the researcher's presence, thus enhancing the opportunity to observe the environment and participants as they really are in daily life (Lewis, 2009).	Data collection occurred over one school term.
Triangulation The researcher uses multiple sources of data or multiple methods to pool judgements and confirm the emerging findings (Merriam, 1998).	Data was compiled at a number of stages and triangulated across sources. Triangulation occurred at a whole-case level through the combination of analysed questionnaires and, ICT task data sets. Triangulation also occurred for embedded participants with the creation of six in-depth technology profiles and student narratives, which provided rich theoretical accounts of students and family technology practices.
Peer examination or debriefing A peer familiar with the research or the phenomenon involved should review methods and interpretations to provide an external check on the research process (Merriam, 1998).	Data was reviewed and discussed with class teacher and research supervisors throughout the data collection and analysis processes.
Researcher bias The researcher clarifies bias from the outset of the study to uncover the collective unconscious embedded in intellectual practices by the field's objectifying relations (Maton, 2003).	Bourdieu's epistemic reflexivity was considered and applied in the construction of the research object and throughout data collection and analysis to address three levels of researcher bias (see section 4.5.2).
Member checks The researcher obtains member checking, whereby stakeholder groups from whom the data was originally collected verifies it (Lincoln & Guba, 1985).	Member checks were undertaken with the class teacher during the ICT task scoring process Member checks were also built in to the data collection strategy, which involved students sharing questionnaires and blog activities with family members to ensure accurate details of family practice and resources were provided.
Thick descriptions Providing enough description so that researchers will be able to determine how closely their situations match the research situation (Merriam, 1998).	The study's findings have been presented with thick contextual description that allows the reader to make decisions about transferability.
Analytic generalisation The case results are generalised to broader theory (Yin, 1994).	The application of Bourdieu's theory of practice conceptually, methodologically and analytically allowed generalisation of case results to the theoretical framework.

A number of research strategies were employed throughout this study to enhance trustworthiness and credibility of data, including triangulation of data, prolonged and substantial engagement, peer debriefing and an audit trail. The researcher's teaching role within the site school allowed for a natural trust relationship with participants as well as insights into contextual subtleties within the case. Another principle the researcher followed to enhance the dependability of this study was to maintain a chain of evidence (Appendix R). The chain of evidence, or audit trail, is designed to allow the reader of the case to follow the derivation of any evidence, including what was done, when and how (Yin, 2003). Data sources were triangulated to check for consistency, as Yin (1994) acknowledges that the opportunity to converge many different data sources is a major strength of case study data collection.

Although case studies have limitations, they are by far outweighed by their strengths (Merriam, 1998). The case study design was chosen to provide thick contextual description. However, the findings present a detailed description of only one circumstance, and it is unlikely that they will be replicated in another context. It is acknowledged that this study serves to further understanding about the relationship between students' ICT backgrounds and level of school-based ICT literacy, but not to allow generalisations. The burden of generalisability 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).

9 Summary

This study adopted a qualitative embedded case study approach, as the most appropriate approach, to allow for in-depth investigation of how differences in primary school students' ICT experiences at home shape their school-based ICT literacy practices. Most importantly, the study sought to provide insights from the students' perspectives on what factors influence their level of ICT literacy, an area of research that is yet to be explored. Data was collected from a class of Year 6 students in a regional Australian public school. A novel approach to understanding a measure of ICT literacy was taken through the unique combination of data forms including questionnaires, a digitally recorded ICT literacy task, semi-structured reflective interviews and student blog

activities. This data collection strategy was guided by the Bourdieu's theory of practice and was most appropriate for uncovering contextual conditions that presuppose students' ICT literacy practices. Data sources were analysed through a process classifying, summarising and interpretation, which took account of emergent themes, the guiding theoretical framework and the study's research questions. Such an approach is typical of qualitative research and allowed for the triangulation of the unique data set to create contextual profiles detailing the varied and rich ICT experiences and possibilities that work to shape school-based ICT literacy. A range of verification procedures were applied throughout the study including prolonged engagement, triangulation, peer examination, reflexivity to clarify researcher bias, member checks, thick description and analytic generalisation. The application of each of these procedures enhances the quality of the study and enables readers to assess the researcher's interpretations.

CHAPTER FOUR

Technology in my life: Understanding differences in primary students' ICT experiences

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Chapter Four presents findings about students' home ICT experiences. The purpose of this paper is to provide background data about students' family ICT experiences, including ICT resources, family ICT practices, values and demographics. Drawing on questionnaire data from Phase 1 of this study, the paper details the ways in which the participants and their families accessed and engaged with ICTs during the course of a regular week. Analysis of this data used the theory of practice as a conceptual framework and ASCO occupation categories as a measure of socioeconomic status (Castles, 1986). This allowed for a detailed exploration of students' ICT backgrounds to develop a more sophisticated understanding of their ICT use and engagement. As part of the thesis, this chapter reports background data about the whole class case, and helps to answer Research Question 2, "How can the ICT experiences of Year 6 primary school students be characterised in terms of the theory of practice?" As a stand-alone paper, it adds to the literature by highlighting the type of dispositions, family practices and technological capital that may enable or constrain effective access to ICT and offers suggestions for how educators and schools can tailor learning experiences to promote digital inclusion. This paper has been prepared as a journal manuscript for submission to *Learning Media & Technology*. This journal was selected as it publishes research that builds on contemporary debates including the social, cultural, economic and political nature of educational media and technology. The paper is suited to the journal as it takes a critical approach to understanding the ICT practices of primary students in the social,

cultural and economic context of their home fields while considering the impact of the broader social positioning of their families.

1 Abstract

This paper presents findings from a study that investigated Australian primary school students' home experiences with ICT, including available support and resources, to better understand their ICT practices. Data was collected from 23 Year 6 primary school students in the form of an open-ended student questionnaire, delivered as a regular classroom lesson. The results showed differences between families' ICT practices and experiences within their home environment. The findings add to discussions about how students' dispositions and the differences in economic, social and cultural resources available in young people's home environments can contribute to the digital inequality that can have lasting impacts on their lives, and on society in general. The implications of these findings for school education are examined, and possible strategies to redress digital inequality are suggested.

2 Introduction

The digital divide describes patterns of digital inequality between those who have the skills and competencies to effectively access ICT and those who do not. While in the past the notion of digital divides focused on access to technology, increased presence and access to ICT in modern society has shifted the focus to inclusion and participation (Ahn, 2012; Yelland & Neal, 2013). In this way, the digital divide has been associated with an individual's socioeconomic status, geographical location and ethnicity. Research indicates that patterns of digital inequality occur as a result of the availability of technological possibilities, varying human support and resources to which different people have access (British Educational Communications and Technolgy Agency [BECTA], 2001; Gunkel, 2003; OECD, 2010). Given the increased focus on ICT literacy as a necessary skill to function in the modern world, together with the notion of social justice for all students that is increasingly advocated in advanced western societies (Livingstone, Byrne & Bulger, 2015; MCEETYA, 2008; OECD, 2010), consideration of how to best reduce this digital divide is imperative. However, to address digital divides amongst children and young people first requires an understanding of how they access and engage with ICT. Such an understanding is an important starting point from which to recognise the differing ICT experiences that contribute to the digital inclusion and exclusion of young people.

This paper reports on a research study that explored how primary school students and their families from differing socioeconomic backgrounds, within one Australian public school, accessed and engaged with ICT during a regular week. The following section provides a brief overview of the research investigating young people's ICT practices and explains how this study was conducted using the theory of practice (Bourdieu, 1977) as the framework for conceptualising differences in students' ICT experiences. The findings from the questionnaire data are then presented, highlighting variations in students' differing family backgrounds in terms of family practices and social and cultural resources. These findings uncover the types of resources and support one class of primary students are able to draw upon when using technology and provide insight into the way such stocks of capital may work to shape differing ICT possibilities. The implications of these findings, including pedagogical implications for teachers and policy-makers, are then discussed.

3 Background

The body of large-scale research provides evidence of the emergence of digital divide, acknowledging the influence of socioeconomic status and access to capital on children's ICT literacy achievement (ACARA, 2012b; Livingstone et al, 2011; Livingstone et al, 2014; OECD, 2010; Sozzio et al, 2015). What is not clear from these studies is how differing access to support and resources, commonly referred to as capital, shape a child's ICT practices and literacy.

Accordingly, there is a body of qualitative research work that offers a more detailed understanding of these underlying forces that work to shape ICT practices and achievement. Discussing the significance of children's home context, these studies draw attention to ICT as a social practice, highlighting the realities of family ICT practice that work to shape children's ICT related identity, practices and possibilities (Downes, 1999; Stevenson, 2008; Thrupp, 2008). Further, evidence suggests that families' ICT practices tend to fit into pre-existing class structures, leading to digital inclusion for more advantaged groups and exclusion for the most disadvantaged (Hatlevik & Gudmundsdottir, 2013; Samuelsson, 2012; Smith et al., 2013). These findings illustrate how ICT simply reinforces the reproduction of social inequalities. Such reproduction

occurs in practice as the education system privileges dominant middle class culture, which leads to a mismatch of cultures for other family groups (Reay, 1998). While these empirical studies highlight the significance of home and family practices in shaping children's ICT practices and point to the broader sociological notion of reproduction, the kinds of family practices and resources that lead to digital exclusion or inclusion, in terms of ICT literacy achievement, are not clear.

Recent research investigating ICT use and engagement at home and school suggests viewing these two sites as mutually exclusive is a misnomer, as children negotiate their ICT practices across the contexts they participate (Gronn, Scott, Edwards & Henderson, 2014; Bulfin & North, 2007). In particular, a study investigating the technology use of three primary aged siblings from an above average catholic school in Australia found that the siblings had high levels of access to similar technologies across home and school settings and their Internet use was mostly positioned towards basic information gathering or rote learning in both contexts (Gronn et al., 2014). The authors suggest that an understanding of the way children negotiate their ICT practice across contexts may be more valuable in the design of effective learning experiences than a focus on the differences between home and school. As the qualitative study only offers accounts of three children the findings raise questions about the ICT experiences and negotiations of other primary students from different backgrounds in relation to the school field. Similarly, an earlier study critiqued explorations of young people's ICT use and practice through a home school binary, arguing instead that ICT practices develop around the use of ICT and flow across these spaces (Bulfin & North, 2007).

Selwyn (2004) reconstructed the notion of the second digital divide as "a hierarchy of access to various forms of technology in various contexts, resulting in differing levels of engagement and consequences" (p. 351). Acknowledging that many differences can be traced back to the differentiation in a person's capital, he conceptualised 'technological capital' as a subset or extension of social, economic and cultural capital (Bourdieu, 1984; Selwyn, 2004). The notion of technological capital together with the concepts of field and habitus as part of the theory of practice (Bourdieu, 1977), form a pragmatic lens through which to understand the particular positioning of families and individuals within those families, and, importantly, the strategies they embody that come to constrain or enable technology use. Research exploring and conceptualising adults ICT

practices through a Bourdieuian lens highlights the potential of such a conceptualisation to better understand structures and dispositions that presuppose ICT practice and shape digital inequalities (Helsper, 2008; Servon, 2008; Van Dijk, 2005). Yet the practices of children, young people and adults are vastly different in terms of development, autonomy and fields of practice. Thus the empirical application of such a framework to understand digital inequalities in children's ICT practice and performance seems imperative.

In this way, a number of researchers have drawn on Bourdieu's constructs of habitus, field and capital to understand children's and young people's ICT practices (Cranmer, 2006; Hollingworth et al., 2011; Robinson, 2014; North et al., 2008). The results from these studies further illustrate that home context and socioeconomic status are major factors in young people's skill and level of engagement with technology. What is not known is how differences in home ICT experiences shape student engagement with technology and the development of ICT literacy. Whilst the findings from these studies make a significant contribution by drawing on theory to acknowledge the influence of socioeconomic background and access to capital upon children's and young people's engagement and meaningful use of ICT, there is a lack of detailed empirical understanding of the types of capital within primary students' home fields that may come to constrain or enable their ICT literacy practices. The research study reported in this paper adds to the literature by providing a theoretically grounded investigation to better understand the influence of one class of primary students' backgrounds upon their level of engagement with and meaningful use of ICT.

4 Methodology

The purpose of this study was to understand how students and their families within one Australian public school accessed and engaged with ICT in their home during a regular week. The study applied the theory of practice (Bourdieu, 1977), comprised of the theoretical constructs of habitus, capital and field, to understand how students' ICT practices and possibilities are shaped by their available practice, support and resources. The study was guided by the following research question: "How can the ICT

experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?"

Drawing on the characterisation of technological capital (Selwyn, 2004), with a focus on the dynamic interaction between individuals (habitus) and the surroundings in which they find themselves (field(s)) (Mills & Gale, 2007), this study was framed by the theory of practice, providing empirical tools at a methodological and analytical level. As a methodological tool the theoretical constructs provided a framework for the types of data, tasks and questions that might capture an understanding of a student's access and engagement with ICT. Specifically shaping the design of questionnaire items and prompted the inclusion of member checking by parents to allow for the collection of a rich set of data that revealed objective structures and dispositions that shape primary students' ICT practice. Questionnaire items linking to each theoretical component are detailed in Table 16 below.

Table 16. Questionnaire items linked to the theory of practice

Theoretical component	Description	Questionnaire item
Habitus	Personal disposition/inclination toward the use of or experiences with technology	Do you like using computers and the Internet? Can you tell us why? Favourite/least favourite activities My (student) technology timetable – use, time, purpose Self-efficacy
Field	Home environment, including resources available, culture of technology use, contacts, rules surrounding use and position within the home field	List all of the people living in your home Location of technology My (student) technology timetable – location Family technology timetable – location, uses, time
Economic capital	Material resourcing of students' home and school environments, including quality and quantity of equipment and capacity for maintenance and upgrade of equipment (Selwyn, 2004, p. 355)	What are your parents'/carers' jobs? List all of the technologies in your home; include the number and type
Cultural capital	*Embodied* Self-interest in investing time into self-improvement of ICT skills Active participation in ICT education both formal (within school) and informal (outside of school) *Objectified* Socialisation into technology use and 'techno-culture' via techno-cultural goods (e.g. exposure to ICT via magazines, books and other media), family, peers and other agents of socialisation (Selwyn, 2004, p. 355)	Do you like using computers and the Internet? Can you tell us why? Favourite/least favourite activities My (student) technology timetable – use, time Family technology timetable - uses, time Who taught you to use computers and the Internet?
Social capital	Students' network of 'technological contacts' and support. These can be face-to-face (family, friends, neighbours, tutors, and other 'significant others'; membership of groups/organisations) or remote (online help facilities and commercial help lines) (Selwyn, 2004, p. 355)	Family technology timetable – uses Who taught you to use computers and the Internet? Who helps you when you are stuck?

As an analytical tool, the theory of practice allowed for themes and patterns to be coded and students' backgrounds to be mapped to illustrate the dynamic interaction (capital exchange) between students (habitus) and their home surroundings (field(s)). Such an approach allowed for a detailed understanding of the influence of dispositions, contextual conditions and the different forms of capital on the ability of individuals and groups to make meaningful use of ICT (Selwyn, 2004).

Data collection for this study consisted of a qualitative student background questionnaire with one class of students in their final year of primary school (Appendix E). The questionnaire was designed to collect information about the ICT practices of students and their families within the home (field), to better understand their personal dispositions (habitus) and available resources (capital), and, importantly, how such factors shape students' ICT practices. Importantly, the qualitative questionnaire was specifically designed as part of a regular lesson exploring the role of technology in students' lives. The lesson was designed with the class teacher as part of the students' regular class program to address Australian Year 6 Human Society and Its Environment and Science & Technology syllabus outcomes (Appendix F). The questionnaire itself took the form of an in-class collectable worksheet activity and homework task. The design and layout of the worksheet was typical of a regular class activity.

The design of the qualitative questionnaire, as a collectable in-class and homework activity, is reflective of a holistic inductive design of naturalistic inquiry typical in qualitative research (Patton, 2014). The authentic nature of the data collection instrument was a unique and important part of this study and appropriate when working with children as it provided a space for primary students to share their practices and family demographics in a familiar format with a level of anonymity (Gallagher, 2009). The written open-ended questionnaire format was also selected as it catered for students who may not have the confidence to speak and share practices in a focus group or interview (Hill, 2006).

Twenty-three Year 6 students from one class at a regional New South Wales public school participated in this study. The questionnaire was delivered as a part of a regular technology lesson in a team teaching situation, with the team consisting of the classroom teacher and the researcher. There were two parts to the questionnaire. Side A,

All About Me, was completed in class; Side B, My Family, was completed at home. Questionnaires were sent home as part of students' weekly homework so that they could complete Side B with their families. Administering the questionnaire in this way allowed student data to be member checked by their family for accuracy and reliability.

The participating school was composed of a mix of families from varying socioeconomic backgrounds. The school's Index of Community Socio-Educational Advantage (ICSEA) value was 1,010, 10 points above the average Australian value of 1,000. ICSEA is a measure of educational advantage that acknowledges parents' occupation, level of completed education and educational achievement. A value on the scale assigned to a school is the averaged level for all students within that particular school. ICSEA was developed for the Australian government's My School website to enable comparisons of performance in a given school with that of similar schools serving students with similar backgrounds (ACARA, 2014). However, an interesting characteristic of the school is the mix of student backgrounds within the school. For example, the school sits at 10 points above the average ICSEA value, yet the number of students from the bottom quarter of disadvantaged backgrounds is 5% higher than the Australian average distribution.

Two levels of qualitative analysis were applied to student questionnaires. The first level of analysis focused on emerging patterns from student responses. The data was coded inductively, first, to recognise these emerging themes and apply theoretical constructs of habitus, technological capital and field, and then to determine the frequency of these themes. The second level of data analysis focused on comparing topics and themes within and between parental occupation groups. This analysis enabled an exploration of the relationship between a student's family background and differing access and engagement with ICT.

To determine student background groups, questionnaire responses were examined using the single level indicator of parental occupation. Parental occupation data was analysed and grouped according the Australian Standard Classification of Occupations (ASCO) schema (Castles, 1986), a commonly used measure of socioeconomic status in government and academic research (Marks, 1999). The single level indicator of highest status occupation within the home (based on the ASCO schema) was used to determine,

first, occupation categories and, second, broader family background groups grouped by professional occupations and non-professional occupations (Table 17).

Table 17. ASCO major groups (adapted into professional occupations and non-professional occupations)

PROFESSIONAL BACKGROUND	1. Managers and Administrators
	2. Professionals
	3. Associate Professionals
NON-PROFESSIONAL BACKGROUND	4. Tradespersons and Related Workers
	5. Advanced Clerical and Service Workers
	6. Intermediate Clerical, Sales and Service Workers
	7. Intermediate Production and Transport Workers
	8. Elementary Clerical, Sales and Service Workers
	9. Labourers and Related Workers

5 Results

The purpose of this study was to investigate how students and their families within one Australian public school accessed and engaged with ICT to understand how students' ICT practices and possibilities are shaped by their available practice, support and resources. The results are presented in three parts: a description of the students' family backgrounds according to their parents' occupations; brief details of common ICT characteristics; and a description of ICT practices associated with the participants' family background groups. When considering these results it is important to acknowledge that as the questionnaire was based on free recall reporting and ICT tasks that are not at the forefront of students minds may have been overlooked and social desirability possible. However, the completion of the questionnaire in two different contexts, at school and at home to allowed member checking by parents and the lesson plan design encouraging honest responses and allowing time for reflection were several measures taken to address such concerns.

Of the 23 participants who completed the questionnaire, 15 came from non-professional family classifications, and eight from professional family classifications. These family groups and ASCO sub-categories are illustrated in Figure 3 below.

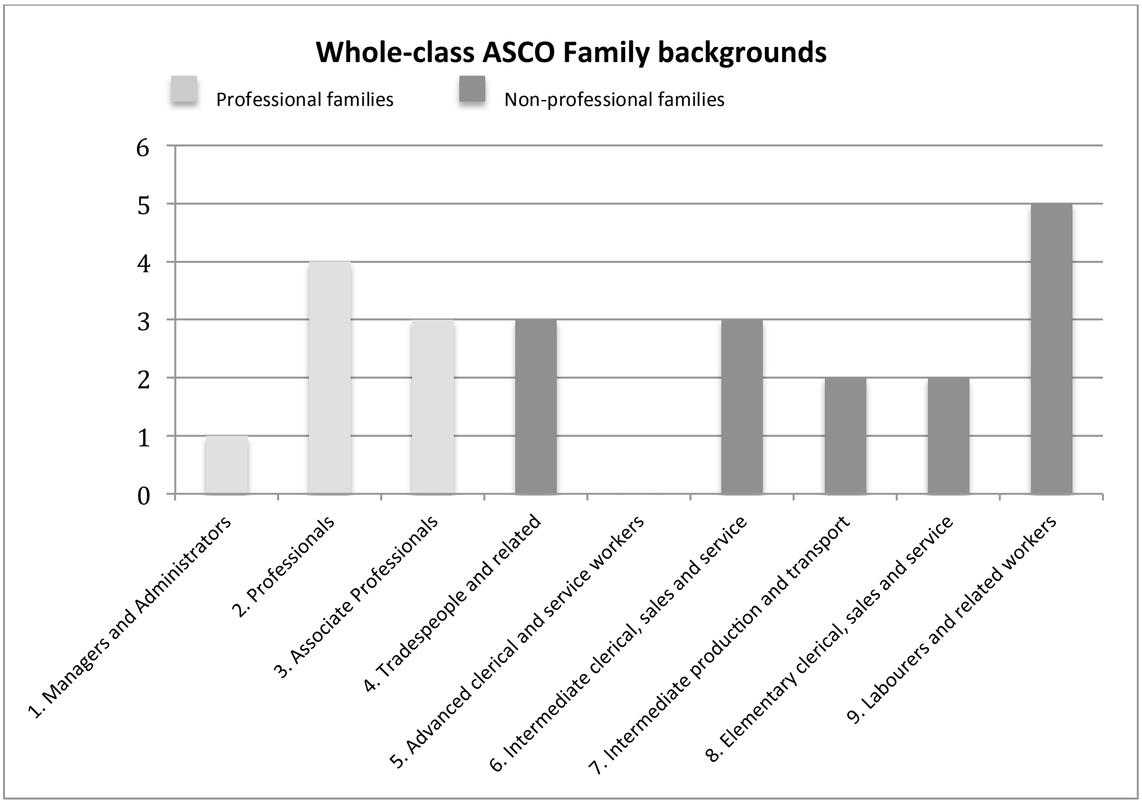

Figure 3. Whole-class ASCO family backgrounds based on occupation

Participants came from a variety of home fields and drew on varying sets of technological capital, which influenced how they accessed and engaged with technologies. Regardless of the differing socioeconomic status (SES) of families within the case, all participants had physical access to a variety of technologies, including at least one computer and Internet access within their home fields. Within the case five students had access to their own computer. Two came from a professional family background; the other three came from non-professional families (two from a more traditional family structure with both parents working, and one single-parent family structure).

All participants expressed a positive disposition towards ICT use and engagement. Moreover, participants all 'liked' using computers and the Internet, although they expressed some variation in the activities they 'liked' engaging in. Favourite activities

included gaming, using Facebook and communicating with family and friends. The least favourite activity most commonly agreed upon was 'homework'. Additionally, more than half the participants who disliked using ICT for homework referred specifically to searching the Internet for information. These participants described this type of homework task as being either boring or frustrating: "Homework and researching because it is boring!!" (Jennifer), "Study cause you never find what you need" (Kara).

In contrast, patterns of practice associated with family background emerged from the case, uncovering differing contextual conditions and stocks of technological capital within both professional and non-professional families. These patterns, summarised in Table 18, included location of ICT, rules surrounding use, weekly time spent using, family use, understanding of ICT, and available support networks. These differences are each explained in more detail below.

Table 18. General patterns of difference in ICT practice between case families

	Differences	**Professional families**	**Non-professional families**
Field	*Location*	Shared computer and Internet use Dedicated work spaces	Private computer and Internet use No dedicated work spaces
	Rules	Clear rules and expectations surrounding use	Some structuring rules Increased freedom afforded by private spaces
	Time	Parents spend more time than students	Students spend more time than parents
Cultural capital	*Family use*	All other family members regular users	Some or all other family members non-users
	Activities	Broader range of family technology activities related to work, study and leisure.	Family technology activities related to leisure
	Understanding	Clear ideas about and definitions of ICTs	Some broader definitions including electrical appliances
Social capital	*Available support networks*	Main technological contacts living in family home Immediate access to support Technological contacts regularly use ICT for a range of activities	Range of technological contacts not always living in the family home Some delayed access to support Technological contacts regularly use ICT for entertainment

Family technology practices and culture of technology use within participants' home field varied in terms of location of technologies, rules and time. A comparison of the location of technologies within family homes revealed that a large number of participants (10) from non-professional families accessed computers and the Internet within the private space of their bedroom. This did not happen in professional families; participants from this background accessed computers and the Internet throughout the home in shared spaces as well as in dedicated workspaces like studies or home offices. In contrast, no participants from a non-professional family background accessed technologies in a dedicated workspace. A number of participants from both groups used different technologies in more than one place in the home; for example, access to a computer in the dining room and an Xbox in the lounge room. As a result of the location of computer technologies, participants from non-professional families tended to

receive less supervision, as they accessed technologies in private spaces, compared to their counterparts from professional family backgrounds, who accessed ICT in shared spaces.

In general the families used the computer and Internet for some time during a normal week. Eight of the non-professional families had at least one member who did not regularly use the computer or Internet at home. In six of these families, the non-users were parents or guardians. Three students had one parent who was a non-user; the other three had both carers/parents who were non-users, two of whom were the participants' grandparents.

In terms of objectified cultural capital, there were differences between parents' use of ICT and activity types. A major difference between the two family groups was the type of ICT practices parents regularly engaged in. Parents from professional families used computers for work-related activities at home, while parents from non-professional families did not. Parents from professional families also described using Skype, reading literature, managing websites and undertaking their own studies, none of which were listed by parents from non-professional families. Activities undertaken by parents and guardians from non-professional families that were not listed by professional families included gaming, card games, poker and gambling in the form of football tipping.

In terms of time engaged with technology, students from non-professional families spent 12.8 hours on average using computers and the Internet at home each week and their peers from professional family backgrounds spent 11.5 hours. Differences in weekly time engaged with ICT was recorded between mothers and fathers, with fathers from professional families spending on average 7 hours per week using ICT and fathers from non-professional families spending 2.9 hours. Mothers/female guardians from professional background families spent an average of 5.3 hours each week, while mothers/female guardians from non-professional families, spent an average of 3.6 hours.

Differences were evident in the students' definitions of 'technology' based on their background. Four students from non-professional backgrounds included exhaustive lists of electrical appliances as well as computer technologies when describing their ICT use

at homes. For example, “TV (4), fridges (2), freezers (1), computer (1), heater (1), microwave (1), stereo (1), clock radio (2), vacuum (1), iron (1), jug (1), washing machine (1), dryer (1), air conditioner (1) and computer (1)” (Kara). Both groups of participants described physical access to a range of ICT in their homes. When asked about their favourite activities, students from the professional backgrounds listed a broader range of activities. Contrarily, one student from a non-professional background described using the Internet for creating, an activity that no other student from either group included.

All students equally identified schoolwork or homework as their least favourite activity for using computers and the Internet. Students from professional family backgrounds spent some time each week using computers and the Internet for homework. However, eight of the 15 students from non-professional families did not report using computers and the Internet to complete any homework during a regular week.

In terms of social capital, participants’ access to technological contacts within the family home varied. When students described who taught them to use computers and the Internet, students from non-professional families referred first to a range of sources including immediate and extended family, teachers and themselves. Five students from non-professional families learnt to use the computer and Internet from a member of their extended family who lived outside the family home. Fewer than half of students from non-professional families identified a parent/guardian (living in the family home) as a source of technology related learning. In contrast, seven of the eight students from professional families identified their parents as a learning source, with one student responding that he was unsure were he had acquired his ICT skills and knowledge. Differences were also evident between family groups when comparing students’ contacts for help when using computers and/or the Internet. Students from non-professional families asked a range of contacts, including parents/guardians (4), siblings (3) and themselves (2). Four students from non-professional families did not have a technological contact they could ask for help living in the family home. All students from professional families had skilled technological contacts living in their family home; students referred to parents (8) first and then siblings (2) for support.

In sum, all participants had access to a variety of technologies, including a computer and the Internet. Collectively, they expressed a shared preference for using computers and the Internet for a range of tasks, as well as a shared dislike for using computers and the Internet for homework. Analysis of the data revealed differences in family cultures of ICT use and the availability of technological capital associated with family background groups.

6 Discussion

The broad aim of this study was to understand how primary students and their families within one Australian public school accessed and engaged with ICT during a regular week to uncover the ways in which students' ICT practices and possibilities are structured. The theory of practice, together with Selwyn's further conceptualisation of technological capital (Bourdieu, 1984; Selwyn, 2004), provided a theoretical lens through which the research was designed and analysis conducted, allowing a detailed examination of factors within students' home fields, including family culture and the different forms of technological capital that work to structure ICT practice.

Data collected from questionnaire responses revealed the varying backgrounds and ICT practices of the participants and their families within the case. The data illustrated that while participants have similar levels of physical access to ICT, differences in family ICT practices along with available social and cultural capital can determine the type of 'effective access' to ICT that students experience. This finding is reflected in current research that makes a link between ICT skills and available social and cultural capital, drawing attention to ICT literacy as a social practice (ACARA, 2012b; Lenhart, Purcell, Smith, & Zickuhr, 2010; Livingstone & Bober, 2005; Livingstone, Bober, & Helsper, 2005a; OECD, 2010). Importantly, findings from this study illustrate how and why variations of such capital may contribute to a person's effective access to ICT. A discussion of this variation, framed by the theoretical constructs of field and technological social and cultural capital, follows.

6.1 Field(s)

The notion of field can be defined as structured systems of social position and networks of social relations, within which manoeuvres take place over resources, stakes and access (Everett, 2002). In this way a student's home field extends beyond the physical and material, including available resources, to include the structured systems of social relations that objectively shape engagement with and use of ICT. For students within this case study, these structured systems included culture of technology use, location of resources, technological contacts, rules and positioning within the family.

Participants' access to ICT was mostly limited to their home and school fields, with only one student discussing his participation in a broader field, referring to specific practices within online gaming communities. As operating in limited fields is typical of primary age students (MCEETYA, 2007), the ICT practices and resources of home and school are fundamental in their conceptualisation and actualisation of technology. This is because students' ICT practices are bound by the fields in which they operate. In this way the home and school frame young people's ICT practice and set limits to what is possible. For students exposed to limited ICT possibilities at home, the school field has the potential to provide increased possibilities that may strengthen ICT literacy and engagement. However, as evidenced in large-scale assessment data, current school practice seems to have little effect on reducing the digital divide (ACARA, 2012b; OECD, 2010).

All participants described a common disposition towards a small range of ICT mediated activities for gaming and communication. However, a deeper analysis of the objective structures of participants' home fields revealed a variation in cultures of technology use, exposing participants to varied ICT possibilities according to family background. These family technology cultures, or doxa, according to Bourdieu, consist of the shared unquestioned beliefs that a person comes to accept as natural and legitimate (Deer, 2012; Webb et al., 2002). The doxic practices that participants from professional families experienced were related to purpose of use, location, parent use, time investment and control over ICT resources. Participants' timetabled ICT use in these families was always in a shared family space, including dedicated workspaces, shaping their conceptualisation of ICT as a tool for work over leisure. Additionally, use of ICT

in shared family spaces allowed for more supervision and access to guidance. Participants in professional families used ICT less frequently than their peers from non-professional families, while the time investment of parents from these families was larger than that of their children. This increased use can be associated with the use of ICT in these parents' working lives. Professional employment both requires and facilitates this engagement, affording parents the skills and knowledge to explicitly and implicitly support their children's ICT literacy practices (Hollingworth et al., 2011). Collectively, these practices contributed to cultures of technology use that valued ICT for work over leisure tasks, encouraged transparency and parental control around students ICT practices and reinforced the dominant position of professional family parents in regards to family ICT practices.

By contrast, participants from non-professional families accessed ICT in unsupervised environments including private bedroom spaces, which allowed for less supervision and more freedom surrounding use. Interestingly, this pattern of use contrasts results of large European population research (Livingstone et al, 2009) that finds children of low SES are less likely to have access in their own bedrooms. This difference raises questions about contextual differences in Australian family homes, perhaps related to increased access to computers resources (ABS, 2011). However, Clark and colleagues (2009) also found children from low-SES backgrounds were indeed more likely to use home technology without adult supervision. Such environments are conducive to risk taking that may result in learning through trial and error. The lack of interaction with parents/guardians, a key difference between groups, is of concern considering the risk involved in operating in an online environment as well as the significant role of interacting with a more knowledgeable other in the process of learning to turn risks into opportunities (Livingstone et al, 2011). The time investment in using ICT by participants from non-professional families was greater than that of their parents, perhaps a result of the absence of ICT practices required within their working lives. While understanding the role of ICT in parents' working lives goes beyond the scope of this study, such findings highlight an important area for further research to better understand students' home ICT practices. Additionally, participants from non-professional families were engaged with ICT more frequently for larger time periods than their peers from professional families. Collectively, these practices contributed to cultures of technology use that valued children's ICT use, supported long unsupervised

periods of ICT use and afforded participants a more dominant position than their parents in regards to ICT practices.

6.2 Technological capital (cultural and social)

What an individual (or group of individuals) can do with ICT is also intertwined with their corresponding levels of cultural capital (Selwyn, 2004). Objectified cultural capital in the context of ICT is considered to be "socialization into technology use and 'techno-culture' via techno-cultural goods, family, peers and other agents of socialization" (Selwyn, 2004, p.355). Patterns of ICT use within each family background group within the case illustrate a differing socialisation into technology use. A number of researchers acknowledge parental skill level is a key area in influencing students' technology experiences and use (Chase, 2010; Facer, Furlong, Furlong, & Sutherland, 2001; Hollingworth et al., 2011; Krause, 2007; Warschauer, 2004). In this case participants' available cultural capital was acquired through the objectified practices of their parents. Students from the professional families were exposed to a broader range of practices than their peers, and demonstrated a clearer understanding of ICT and how such tools may be used across different contexts for different purposes. This wide-ranging understanding of ICT was not commonly evidenced in students from non-professional families, whose technology conceptualisation and actualisation of ICT within their home fields was often limited to the leisure-based activities with which they already engaged.

Social capital is the aggregate of the actual or potential resources linked to the possession of a durable network that provides each of its members with the backing of the collectively owned capital (Bourdieu, 1997, p. 355). Specifically, technological social capital can be described as "a student's networks of technological contacts and support including family, neighbours, tutors and other significant others, membership of groups/organizations or remote online help facilities and commercial help lines" (Selwyn, 2004, p. 355). Within the homes of professional families, participants' main technological contacts all lived in the field, allowing for immediate access to support. These technological contacts regularly used technology for a range of purposes including work, home administration and entertainment, compared with non-professional family homes, where students listed a range of technological contacts

including siblings, parents and relatives, not always living in the family home. For students whose technology contacts came from outside of the family home, this resulted in some delayed access to support. These technology contacts tended to use technology regularly for leisure-based tasks. Murdock and colleagues (1996) discussed people's ability to draw on networks of support as critical in maintaining sustained use of ICT. In this way the social capital of students from professional family backgrounds enabled their effective access in terms of their immediate access to a network of support, with a broader set of technology practices than that of their peers. In contrast, the lower stock of social capital of students from non-professional families constrained effective access in terms of some delayed access to a network of support, with limited technology practices for only leisure-based tasks.

In general, students did not include peers when responding to questionnaire about how the learned to use computers and whom they asked for support. Peer interaction is an area in the literature focused on adolescents ICT practices (Beckman, Bennett & Lockyer, 2014; Johnson, 2009b) that wasn't reflected in this data set. This could be due to the young age of participants and their limited interactions with peers compared to adolescents who function in a wider range of peer related fields at a higher level of autonomy or the questionnaire focus on family practices. Regardless, the exploration of peer support as technological capital for primary aged students offers a potential area for further investigation.

While the sub-groups within the case shared similar characteristics in terms of available social and cultural capital, it is important to highlight that students' access to capital within the home field will not always be the key in determining their ICT practices. The dynamic interaction (capital exchange) between individuals (habitus) and the surroundings in which they find themselves (field(s)) must also be acknowledged (Mills & Gale, 2007). This is particularly evident when considering one participant, Lucas, noted as particularly 'savvy' with ICT by his class teacher and the other students, due to his strong interest in more complex computer and Web 2.0 related activities. Although Lucas came from a non-professional family, typical of his peers in terms of culture of technology use and available capital, he frequently operated in online gaming communities. These online communities were an additional field in which Lucas was exposed to a different culture of technology use with a different set of available

technological capital. In this way, Lucas' ICT practice is a culmination of his personal disposition (habitus) leading him to operate within theses additional fields, through which he has accessed a new set of technological capital. Lucas is then able to use his capital advantage in the other fields in which he operates (school and home) to accumulate more and advance further, resulting in his 'expert' position in both fields. As Murdock, Hartmann and Gray (1996) argued, material resources and economic capacity play a central role in determining initial use of ICTs, followed by the nature and subsequent patterns of use. In Lucas' case his subsequent pattern of use was intertwined with his disposition towards corresponding levels of cultural and social ICT related capital gained from outside the family field.

The empirical application of the theory of practice (Bourdieu, 1977; 1984) highlighted how the fields within which students operated, along with access to technological, social and cultural capital, mediated ICT practices. Students from professional backgrounds had access to technological capital, including a broad range of objectified ICT practices for home, work and entertainment, and skilled contacts that enabled a greater level of effective access to ICT than that of their peers. These practices are more closely linked to formal ICT practices valued within school and with the key processes of ICT literacy. In contrast, students from non-professional families discussed capital linked to leisure activities and less available and lower-skilled support networks. The technological capital practices in these families were not as clearly linked to school and work or, importantly, to the key processes of ICT literacy. While these practices are valid, they are narrower in scope and less valued in the school field. Finally, the role of agency in Lucas' practice demonstrated how his orientation towards ICT (disposition) together with opportunity for experimental practice in his bedroom generated new contacts, possibilities and practices. Importantly, Lucas' story reveals the limitations of focusing on the structured nature of capital and field, a common criticism of Bourdieu's work, without an understanding of personal orientation/disposition and agency in practice.

These findings reflect much of the current literature that suggests ICT literacy practices are a result of how people develop relationships with ICTs and how they are capable of making use of the social resources, which make access useable (Jung, Qiu, & Kim, 2001). The emerging patterns illustrate a difference in the backgrounds of families

within the case, specifically highlighting different types of social and cultural capital that can influence a young person's conceptualisation and actualisation of technologies in their own life. This is reflected in the literature exploring the second digital divide; however, this background data begins to illustrate what technological capital within a student's home field looks like in practice, and specifically how the objective conditions and networks of available support within a child's environment can reinforce the notion of a digital divide regardless of similar or equal physical access to material resources.

These findings suggest several new directions for future research. First, further qualitative data is needed to understand the nature of the complexities of family ICT practices and provide potential explanations of nuances of practice between family groups detailed in this small exploratory case. For example, in-depth case studies comparing a range of qualitative family background data with students' ICT literacy to provide a richer understanding of the digital divide in particular settings. Second there is a need for further large-scale empirical investigations to better understand students' technology practices in terms of habitus, field and capital. Before considering this study's conclusions it is important to acknowledge its limitations, in particular issues with the self-reported nature of the data and the small set of participants. First, the questionnaire represented one data source designed to collect self-reported accounts of ICT use and engagement, including the practices of students' parents and siblings as recorded by participants themselves. Criticisms around the nature of self-reported data include participants reporting accounts that they believe to be socially acceptable, along with issues around memory and consistency. The researcher attempted to overcome these criticisms through the use of member checking: data regarding family practices was completed at home with parents, allowing data to be checked for accuracy and reliability. Second, as a result of the small set of participants, the findings present only one circumstance, and it is unlikely that these conditions will be replicated in another context. However, it is acknowledged that this study serves to further understand how students' backgrounds come to structure their technology use, but not to make generalisations. Thick contextual description about the ICT practices of students and their families are provided to allow the reader to subjectively make connections from the case in hand to their own personal experiences (Stake, 2000).

7 Conclusion

This study aimed to provide a theoretically grounded exploration of one class of Australian primary students and their families accessed and engaged with ICT during a regular week. The findings were intended to illustrate the ways that case students' ICT practices and possibilities are structured. Such an understanding is important for policy makers, schools and teachers to integrate ICT in the classroom in ways that better support digital inclusion for all students. The findings detail students' ICT use and engagement with technologies together with their available social and cultural capital, within their home fields. Differences in the ICT practices and possibilities of family background groups were detailed within the case. More specifically, students from professional family backgrounds had access to a broad set of ICT practices social and cultural capital related to work, school and leisure. Students from non-professional families had access to a narrower set of practices social and cultural capital related to leisure and to a lesser extent school. Understanding students' backgrounds in this way draws attention to the types of family practices and technological capital that may enable more formal notions of ICT literacy, including access to skilled technological contacts and exposure to a wide variety of ICT practices for a wide variety of purposes, beyond leisure-based activities.

The qualitative questionnaire used in this study was underpinned by the Bourdieu's theory of practice with each questionnaire item linked to a theoretical construct. Qualitative analysis allowed data to be first, inductively coded for emerging patterns and second, coded according to the guiding framework. Questionnaire responses provided details of case students' home fields and available resources (technological capital), which were indicative of the 'structured' nature of ICT practice. This 'structured' nature of practice is a key criticism of Bourdieu's work with researchers asserting the theory of practice leaves little room for understanding agency (Jenkins, 2002). Yet, through a focus on the dynamic interaction between habitus, capital and field one student's questionnaire data revealed details of agency beyond the structured practices within his home field. Importantly, understanding ICT practice in this way draws attention to the transformative potential of individuals. Importantly, the findings from this small qualitative study provide details about one class of primary students' ICT practices and illustrate the potential of the theoretical framing to understand

children's ICT practice and possibilities. More in-depth qualitative research with a variety of cases is needed now to document nuances of children and their family's ICT practice that lead to digital inequality.

8 References

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CHAPTER FIVE

Capturing primary students' ICT literacy: A school-based assessment

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Chapter Five presents the findings from a school-based ICT literacy task that was completed by 22 Year 6 students. This paper draws on ICT literacy task and questionnaire data from Phase 1 of this study to provide details of students' ICT literacy in context of their family background. The purpose of this paper was to provide details of students' actual school-based ICT literacy, rather than relying on self-reported data and self-efficacy ratings common in the literature. The ICT literacy task was scored using digitally captured screen recordings and student artefacts. Student results were compared across sub-tasks to identify areas of strength and weakness in terms of the six processes of ICT literacy, drawn from the definition of school-based ICT literacy adopted for this study (MCEETYA, 2007). Results were then analysed in relation to students' family backgrounds. As part of the thesis, this chapter provides in-depth detail of students' school-based ICT literacy for the whole-class case, and helps to answer Research Question 1, "How do Year 6 primary school students perform in terms of their school-based ICT literacy practices?" As a stand-alone paper, it adds to the literature by providing rich and detailed descriptions of Year 6 students' ICT literacy, including both processes and product, as well as examining the influence of family backgrounds in contributing to digital inequalities. The paper has been prepared as journal manuscript for submission to the *Australian Journal of Education*, which publishes research conducted in Australia to inform educational researchers, as well as educators, about issues of contemporary concern in education. Given that the focus of this paper is capturing a measure of school-based ICT literacy using a definition specific to

Australian school education, the findings are relevant to Australian researchers and educators seeking to better understand the diversity of students' ICT literacy and the relationship to their home practices. As this journal is also available internationally, researchers and educators from other countries will also be able to access the findings and interpret them in relation to their own contexts.

1 Abstract

This paper describes a qualitative case study that measured the ICT literacy of 22 upper primary school students in one Australian public school. The assessment task was designed to measure students' ICT literacy, focusing on the six key processes of ICT literacy (MCEETYA, 2007). Data was collected in the form of a questionnaire about students' home ICT experiences and digital recordings of the ICT literacy task, allowing analysis of both process and product. Overall, students performed strongest when completing low-level tasks and weakest when completing higher order critical and creative thinking tasks. Students from professional family backgrounds outscored their peers from non-professional families across all tasks, with the largest differences recorded for higher order tasks compared to low-level information tasks. These variations in ICT literacy represent an opportunity for educators and policy makers to better tailor curricula and learning experiences to address inequalities and strengthen all students' ICT literacy practices.

2 Introduction

ICT literacy is an important aspect of modern life. Accordingly, Australia's national educational goals place considerable importance on the place of ICT in education, asserting that: "in this digital age young people need to be highly skilled in the use of ICT" (MCEETYA, 2008, p. 9). However, the emerging body of research depicts a complex picture of students as technology users. Many young people use ICT in limited ways; these limitations are further exacerbated by factors related to gender, geographical location and family background (ACARA, 2012b; Combes 2009; Cranmer, 2006; MCEECDYA, 2010; MCEETYA, 2007; OECD, 2010; Thrupp, 2010; Eynon & Malmberg, 2011). These findings point to a divide in ICT experiences and achievement, referred to as the digital divide (OECD, 2010). The digital divide describes patterns of inequality between individuals' and groups' access to, use of and/or knowledge of ICT (Norris, 2001). While notions of the digital divide were first concerned with access to technology, ubiquitous access to ICT in advanced western society has shifted the focus to questions of inclusion and participation (ABS, 2011a; Ahn, 2012; Yelland & Neal, 2013). Given that Australia's national goals for schooling assert that schooling should be free from discrimination based on sex, culture, ethnicity, religion, disability, geographic location and differences based on socioeconomic

background (DETYA, 2000, p.41), it is essential that consideration be given to how to best reduce this achievement divide.

This paper reports on a research study that captured the school-based ICT literacy of upper primary school students in one Australian public school. The paper is structured as follows: first, an operational definition of ICT literacy in a primary school context is given. This is followed by an explanation of the design and implementation of an ICT literacy assessment task. The findings from the assessment task are then presented showing the variation in students' ICT literacy and the influence of student family backgrounds on ICT literacy performance. These findings serve as an evidence base to highlight differences in ICT literacy between family background groups. The implications of these findings are discussed in terms of future research directions and pedagogical implications for teachers and policy makers.

3 Background

Drawing from a number of research traditions, the academic discourse around 'digital literacy' is complex and at times conflicting. Conceptual and theoretical work in this area is concerned with the 'idea' of what it means to be digitally literate. For example: digital literacy a departure from traditional literacy or an extension?; the intersections of media literacy and digital literacy to define new media literacy; the plurality of digital literacies as rich contextual social and cultural practices; the ideological and political nature; and the implications for governments, policy and education (Buckingham 2010; Koltay, 2011; Lankshear & Knobel, 2015; Livingstone, 2004; Livingstone & Helsper, 2008; Livingstone, Haddon, Vincent, Mascheroni, and Ólafsson, 2014; OECD, 2015). Despite this rich discourse, schools, curriculum and educators focus on operational definitions of ICT literacy concerned with fostering and assessing the processes of being 'digitally literate' in regards to certain tasks, performances and demonstrations of skills. In Australian primary and secondary schools, the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA, later MCEECDYA and now known as the Standing Council on School Education and Early Childhood (SCSEEC)), with responsibility for the portfolios of school education, early childhood development and youth affairs, define ICT literacy as "the ability of individuals to use ICT appropriately to access, manage, integrate and evaluate information, develop new

understandings, and communicate with others in order to participate effectively in society" (MCEETYA, 2007, p. 3). This definition was adopted in 2007 after consideration of both Australian and international definitions of ICT literacy and remains current in policy and assessment today (MCEETYA, 2007; ACARA, 2015). The definition encompasses six processes of ICT literacy (Table 19).

Table 19. Processes of ICT literacy

Accessing information	Identifying the information needed and knowing how to find and retrieve information
Managing information	Organising and storing information for retrieval and reuse
Evaluating	Reflecting on the processes used to design and construct ICT solutions and about making judgements regarding the integrity, relevance and usefulness of information
Developing new understandings	Creating information and knowledge by synthesising, adapting, applying, designing, inventing or authoring
Communicating with others	Exchanging information by sharing knowledge and creating information products to suit the audience, the context and the medium
Using ICT appropriately	Making critical reflective and strategic ICT decisions about using ICT responsibly by considering social, legal and ethical issues

(MCEETYA, 2007)

Such an understanding of ICT literacy combines concepts of information literacy with aspects of technological expertise. Extending the traditional notion of information literacy in which collected information can be transformed and used to communicate ideas in a new media landscape (ACARA, 2015). In this way, students ICT literacy is tied to information literacy and traditional literacy involving reading, writing, encoding, decoding and applying this knowledge in specific contexts for specific purposes (Lankshear & Knobel, 2008).

The measurement of ICT literacy is a vital component in monitoring student achievement towards Australia's National Goals for Schooling (MCEETYA, 2008). Accordingly, Australian education authorities have charged the Performance Measurement and Reporting Taskforce (PMIRT) of MCEECDYA with responsibility for the National Assessment Program, which is designed to monitor the extent to which students are achieving national goals (MCEECDYA, 2010). The taskforce conducts annual numeracy and literacy assessments with the full population of Year 3, 5, 7 and 9

students across Australia. Sample surveys are also conducted in ICT Literacy every three years with Year 6 (upper primary) and Year 10 (secondary school) students (ACARA, 2012b).

The first national assessment of ICT literacy was conducted in 2005 with a nationally representative sample of 7,400 students from Year 6 and Year 10 in 519 schools (MCEETYA, 2007). Students completed assessment tasks on computers using software that included a combination of simulated and live applications to mirror typical 'real world' use of ICT. Some tasks were automatically scored and others were stored and marked by human assessors (MCEETYA, 2007). This first national report on ICT literacy found that 49% of Year 6 students reached or exceeded the Year 6 proficiency standard and 61% of Year 10 students reached or exceeded the Year 10 proficiency standard. The second cycle of ICT literacy assessments was conducted in 2008, with the report of findings released in 2010. Fifty-seven percent of Year 6 students reached or exceeded the Year 6 proficiency standard in 2008, compared to 49% in 2005, and 66% of Year 10 students reached or exceeded the Year 10 standard, compared to 61% on 2005 (MCEECDYA, 2010). Most recently a third cycle of assessment was conducted in 2011. Sixty-two percent of Year 6 students reached or exceeded the Year 6 standard, demonstrating a statistically significant increase in achievement from 2005 to 2011 (ACARA, 2012b). However, no growth was seen in Year 10 students, with only 65% meeting or exceeding the Year 10 proficiency standard.

Although there has been some improvement in Year 6 across the three cycles of assessment, overall the results indicate that many students still use ICT in a relatively limited way, and, perhaps most significantly, that the proportion of low-achieving students in both Year 6 and 10 has remained constant since 2005 (ACARA, 2012b). Analysis of student achievement against student demographic data indicates that parental occupation is a significant indicator of a student's ICT literacy. For example, Year 6 students whose parents were senior managers or professionals had scores that were 83 score points higher than those with parents who were recorded as unskilled labourers or office, sales or service staff (ACARA, 2012b). Given the significant role of ICT on modern life, students who do not develop ICT literacy are likely to be limited in their participation in economic and social life. While this data clearly demonstrates a socioeconomic divide in primary students' ICT literacy achievement, there is little

evidence to explain how and why this is occurring. Therefore, understanding the impact of the students' background upon their ICT literacy seems imperative, as educators and schools have the potential to bridge this emerging social divide for students who lack the capital that allows them to benefit from ICT (OECD, 2010).

Similarly, several key large-scale international studies, such as the OECD PISA report (2010), *EU Kids Online* and *Net Children Go Mobile* (Livingstone, Mascheroni, Ólafsson, & Haddon, 2014), and the *American Pew and Internet & American Life Project* (Lenhart et al., 2010), also depict varying patterns of ICT literacy that are closely linked to a student's socioeconomic status and access to varying levels of capital. The result of differing access to these economic, social and cultural resources is a divide in ICT engagement and achievement between socioeconomic groups, more commonly referred to as the digital divide (OECD, 2010). This digital divide goes beyond the initial digital access divide, which focused on differences in technology access, to the differences between those students who have access to learning the necessary ICT skills and competencies and those who do not (OECD, 2010).

Whilst findings from these studies make a significant contribution by providing a general picture about students' use of ICT and the influence of their background context, there seems to be a lack of detailed empirical understanding of students' school-based ICT literacy. This gap in understanding includes information about students' levels of engagement with and approach to school-based ICT literacy, along with qualitative details about the types of tasks they engage in skilfully and those they have difficulty mastering, including examples of practice instead of simple scores and descriptors. One of the challenges for researchers, practitioners, teachers and parents is to begin to make sense of the diversity in students' ICT literacy so as to develop more specifically targeted initiatives that better support groups of young people in addressing the digital divide (Eynon & Malmberg, 2011). The research study reported in this paper addresses this gap in the literature by providing a qualitative investigation into what students' school-based ICT literacy 'looks' like in one Australian primary school, including areas of strength and weakness and patterns of variation within and across the case that are associated with family background.

4 Methodology

This research focuses on the operationalistaion of ICT literacy adopted in the Australian National Assessment Program of ICT literacy. The study was conducted as part of a larger case study of students in a Year 6 class (aged 11-12 years), in their final year of primary school in Australia. Year 6 students were purposively selected for the study, as they are a target group within Australia's National Assessment Program ICT proficiency test, allowing for a detailed examination of students' school-based ICT literacy within a naturalistic setting. It is acknowledged that focusing on one measure of ICT literacy, used in the Australian National Assessment Program, excludes other ICT practices. However the focus of this study was to provide rich qualitative detail of students' school-based ICT literacy performance given in the results of the large scale Australian National Assessment Program of ICT literacy. Data was collected in the form of background questionnaires and a digitally recorded ICT literacy assessment task (hereafter referred to as 'ICT task'), which the students completed as part of their regular class work. The study was guided by the following research questions: "How do Year 6 primary school students perform in terms of their school-based ICT literacy? Is performance associated with family background groups?"

4.1 Participants and school context

The 22 participants in this study came from one Year 6 class of 28 students in a regional public school in NSW, Australia. The school had an Index of Community Socio-Educational Advantage (ICSEA) value of 1,010, 10 points above the average value of 1,000. ICSEA is a scale that represents levels of educational advantage. A value on the scale assigned to a school is the averaged level for all students in the particular school (ACARA, 2014). However, the number of students from the bottom quarter in terms of disadvantaged backgrounds was 5% higher in this school than the Australian average distribution, highlighting the mix of student backgrounds within the school.

The school leadership valued, promoted and supported ICT for teaching and learning. Classrooms were well resourced with ICT including interactive whiteboards and computer mini labs in every teaching room along with two dedicated one-to-one computer labs. The dedicated focus on ICT for teaching and learning through teacher

professional learning and available resources were unique characteristics of the school compared to other primary schools in the region. The school had not previously participated in the National Assessment of ICT literacy,

Twenty-five students consented to participate in the study, of whom 22 participated in the ICT task. The class was selected as the case due to the mix of family backgrounds anecdotally noted by the class teacher. The key characteristics of the class included: two experienced class teachers with a strong interest in ICT for teaching and learning; students representative of typical Year 6 children including variation in academic ability, interests and motivations; and ICT embedded in learning programs through daily interactions with class and school technology tools.

4.2 Task design

The aim of the ICT task was to measure students' ICT literacy, focusing on the six key processes used in the Australian National Assessment Program of ICT literacy: accessing information, managing information, evaluating, developing new understandings, communicating with others and using ICT appropriately (MCEETYA, 2007). The ICT task, designed to follow the same structure as the larger modules used by the Ministerial Council for Education, Early Childhood Development and Youth Affairs [MCEECDYA] National Assessment Program – ICT Literacy Years 6, was open-ended and used live software applications including Microsoft Word and web browsers on desktop computers. Existing modules were not integrated into this study, as they were not available for use outside the National Assessment Program. Additionally, the qualitative focus on one ICT literacy task was taken given the burden of time required to focus on product and process, digitally capturing students' engagement with the task as well as assessing end product. This approach was adopted as the study was concerned with qualitative exploration of Australian school students' ICT literacy, given the diversity in performance captured by the National Assessment program over the last decade

The ICT task, detailed below in Table 20, was designed to fit in with the class' existing Human Society and Its Environment unit of work. The ICT task, called Design a Flag, required students to collect information about flags and symbolism and synthesis this

information into short summaries, then create a flag to symbolise Australia and justify their design. The ICT task was composed of 11 sub-tasks separated into two parts: Part A: Working with information and using ICT responsibly, and Part B: Creating and sharing information. During Part A, students were required to collect information from two linked web sources provided to them, and find an additional source of their own. The first linked source was a website designed for use by primary students that integrated a combination of pictures and small chunks of age appropriate text. The second included a larger body of text that, while it was comprehensible for the target age group, had not been designed specifically for primary students. This website featured a number of internal links, including commercial links within the main body of the text, and did not include any images. Students then required to write a short justification of their chosen source and synthesise the information they had collected. Students used Microsoft Word to word-process this information. Part B required students to access a learning object within which they were able to design and create a new Australian flag. When students had completed this activity and imported their flags into their document, they were asked to describe and justify their flag design, making links to their synthesis in Part A. Each step within the ICT task was linked to an ICT literacy strand and a key process of ICT literacy (Table 20).

Table 20. Design a flag – ICT literacy task

	Task	ICT literacy process*	Description
Part A: Working with information *	1. Getting started	Accessing information; Managing information	Follow a set of simple instructions to access the ICT task's web page, open a Word document, organise document structure and save/store the file in the correct location with the appropriate file name for retrieval and reuse.
	2. Flag facts	Accessing information; Evaluating	Use links to navigate to a website to compile a list of important facts within a Word document. Identify and retrieve information from their chosen source while making judgements regarding the relevance and usefulness of the information to their needs.
	3. Selecting a source	Accessing information; Evaluating	Use a search engine to select an appropriate website to add additional information to list of facts.
	4. Locate appropriate information	Developing new understandings	Access information from the selected source, adding at least three relevant and useful facts, checking for relevance, paraphrasing and editing for logic and sequence.
	5. Justify source choice	Evaluating; Using ICT appropriately; Communicating with others	Include URL and detail why the chosen source is appropriate. Make judgements regarding the integrity, relevance and usefulness of information.
Part B: Creating and sharing*	6. Write a short report	Developing new understandings; Communicating with others	Use information to synthesise a short flag report, creating new information and knowledge by synthesising, adapting or authoring to suit audience, context and medium
	7. Functional task: learning object	Accessing information	Open the learning object and complete activity.
	8. Functional task: screen shot	Accessing information	Take a screen shot of the flag image.
	9. Functional task: import image	Accessing information	Import image into the Word document.
	10. Describe and justify flag design	Developing new understandings; Communicating with others	Describe and justify the flag design using concepts from tasks 1-3. Reframe and expand existing information to create an information text to suit audience, context and medium.
	11. Formatting	Managing information; Communicating with others	Format headings, font, style and size to reflect structure and consistency.

* Processes and strands defined in the Australian National Assessment Program of ICT Literacy (MCEETYA, 2007)

The ICT task was delivered to students as a website featuring three pages, step-by-step instructions, links to external information sources and a learning object (TLF, 2009) that students completed as a component of the broader task. Task difficulty was aligned with formative class assessment records and benchmarked progress levels from the Australian National Assessment Program of ICT Literacy in 2008 (MCEECDYA, 2010). While the ICT task was initially designed by the researcher, consultation with the class teacher in terms of ICT processes and functions allowed the design to be customised to fit curriculum outcomes for the class, and therefore be integrated as part of the class unit of work. It is important to note that while the content focus of the task was flexible, the key processes could remain the same; for example, the task could easily be redesigned to explore a different content area while still following the same processes. This was a key consideration in the design of the ICT task itself, allowing the processes of ICT literacy to be the focus, rather than the cognitive demands of new content. In this case the students had been developing their own countries using an assigned model of government, and part of this larger task had been to develop a flag for their nation, so they had some previous learning experiences focusing on flags and symbolism.

4.3 Data collection

The ICT task was delivered during a two-hour morning session in the school's computer lab. A lesson plan was developed to assist the smooth running of the task in a timely manner for both the class teacher and researcher. Twenty-two students participated in the ICT task. Data was collected from each student in the form of a final printed task and a Microsoft Word file along with a movie file, created using screen recording software (Debut), of the students' actions during the designated task period. The artefact produced during the task, both printed and Word file copies, were collected for analysis along with the screen recordings of students' working throughout the two-hour task. This rich data was collected to gain a deep understanding of students' technology use, together with their school-based ICT literacy.

4.4 Data analysis

The ICT task was marked using scoring criteria outlined in a marking rubric. Students' final printed work artefacts and the digitally captured ICT task allowed both the final product as well as the process students undertook to be assessed. The design of the marking rubric was an iterative process informed by the ICT proficiency scales (ACARA, 2012), NAPICT assessment exemplars (ACARA, 2011) professional knowledge of curriculum and assessment and students' actual practice. The rubric was piloted using three students' ICT task performances, after which changes were made to marking scales, total score and number of descriptors to allow more detailed differentiation between student work. Tasks were marked twice, initially with the class teacher using the refined scoring rubric followed by a second marking during which the researcher noted the recorded processes against task marks for each student. The total task was scored from 23 possible points. After all students' tasks had been scored, comparisons were made using averages, and highest and lowest scores for the whole group and between boys and girls. Scores for each sub-task were then compared across the whole group and a summary of results was compiled. Result summaries including student created content and process descriptions for each sub task were also compiled, allowing the characteristics of performance to be analysed and compared.

A second level of data analysis then focused on comparing students' actual ICT performance against socioeconomic-status (SES) information. SES information was collected from student background questionnaires. In terms of the SES background, questionnaire responses were examined using the single level indicator of parental occupation. While there is no single correct measure of socioeconomic status, the Australian Standard Classification of Occupations (ASCO) schema (Castles, 1986) is one measurement that has been used in government and academic research in Australia since the mid-1980s (Marks, 1999). The ASCO schema was selected for the purposes of this study based on the single level indicator of parental occupation being available to the researcher. While both educational level and occupation were initially of interest to the researcher, ethical consideration was given to the age and knowledge of students in regards to their parents' background, and a single level indicator of occupation was selected as the most accessible and appropriate data type.

5 Results

The purpose of this study was to capture a measure of primary students' school-based ICT literacy to understand what students' school-based ICT literacy 'looked' like in one Australian primary school, including areas of strength and weakness and patterns of variation within and across the case that were associated with family background. The results are presented below in two parts: the details of students' ICT task performance across the 11 sub-tasks for the case, and the patterns of ICT literacy performance according to family background.

5.1 Class scores

The average student score was 13.75 out of 23 (60%). The ICT literacy processes and average scores across the class group for each of the 11 sub-tasks are shown in Table 21. This is followed by an explanation of the characteristics of students' ICT literacy for each of the 11 sub-tasks.

Table 21. Average student scores

Task	ICT literacy process	Maximum score	Average score	%
1	Accessing information Managing information	3	2.82	94%
2	Accessing information Evaluating	2	1.23	62%
3	Accessing information Evaluating	3	1.45	48%
4	Developing new understandings	2	1	50%
5	Evaluating, using ICT appropriately Communicating with others	2	0.32	16%
6	Developing new understandings Using ICT appropriately Communicating with others	3	1.41	47%
7-9	Accessing information (functional)	3	3	100%
10	Developing new understandings, Communicating with others	3	1.45	48%
11	Managing information, Communicating with others	2	1	50%
Total		23	13.75	60%

5.1.1 Task 1: Getting started

Task 1 required students to locate and launch applications and organise documents for retrieval. The average student score for Task 1 was 2.82 out of 3 (94%). In terms of *accessing information* and resources all students were able to get started, demonstrating knowledge of how to locate and launch applications. When *managing information* by saving a Word document for retrieval and reuse, all students were able to save their document; however, a small number of students (4) saved to the wrong location or made simple file name errors.

5.1.2 Task 2: Flag facts

Task 2 required students to collect a list of relevant flag facts from two given sources. Most students copied information without checking for relevance, or editing for logic and sequence to suit the purpose of their list. A breakdown of student scores according to the scoring criteria is included in the Table 22 below.

Table 22. Task 2 student scores

Scoring criterion	**Score**	**# students achieving this score**
Types or copies and pastes information, checking for relevance and editing for logic and sequence.	2	6
Copies and pastes information without checking for relevance, editing and logic.	1	15
No facts or vague and irrelevant information.	0	1

Only one of the six students who ‘typed or copied and pasted information whilst checking for relevance editing for logic’ collated this information by paraphrasing and typing a fact list, demonstrating some skill in developing new understandings. Additionally, 11 students accessed both linked sources, from which they collected information for their flag fact list, while 10 students accessed only the first link and one student didn’t access either of the provided sources to collect information. Eight students viewed both links but only used the first link as a source of information.

5.1.3 Task 3: Selecting a source

Task 3 required students to use a search engine to select an appropriate website to find additional information for their flag fact list. A breakdown of student scores according to the scoring criteria is included in Table 23 below. This table shows that most students were able to locate a website using some relevant keywords; however, their engagement with the returned search varied between selecting the first listed link (9) and engaging with the content to select an appropriate source (10).

Table 23. Task 3 student scores

Scoring criterion	***Score***	**# students achieving this score**
Uses a search engine by selecting relevant keywords and selects an appropriate website.	3	1
Uses search engine with some relevant keywords and selects an appropriate website.	2	10
Uses search engine with some relevant keywords and chooses the first listed website in search.	1	9
Doesn't use search engine to locate appropriate website.	0	2

The searching behaviours of the students within the case varied. Sixteen of the 22 students used topic words with articles, prepositions, clauses or questions within their search terms rather than simply using keywords, illustrating a basic of knowledge of the function of a search engine; for example search terms included "Important information about the Australian flag" (Karen) and "what do the stas [stars] stand [for] on the Australia flag" (Mac). Thirteen students searched more than once, changing or refining their search terms for each new search. Of these students, two modified their search to include 'kids', allowing them to locate age appropriate text.

Ten students selected an appropriate source, although different behaviours were observed in this process. Five of these students spent time reading and evaluating a number of websites before selecting the most appropriate source, while five selected the first source after skimming through and evaluating it for relevance. Alternatively, nine students searched a number of sources without focus, demonstrating a lack of skill in identifying key topic terms, locating an appropriate source to meet their needs or locating appropriate information within a chosen source. An example of this was James,

who used a question as his search term: “what does the blue stand for on Australian flag”. James navigated through five links, returning back to the original search each time even though the direct answer to his question was within two of the five links, and on one website was highlighted under a subheading. He was unable to demonstrate ability in *accessing* relevant information, missing key information even when tracking the source with the mouse. James was unable to identify key words and, in turn, relevant information.

5.1.4 Task 4: Locate appropriate information

Task 4 required students to add at least three relevant and useful facts to their list from their chosen source, checking for relevance and editing for logic. Most students were able to add some relevant information; however, the level of engagement with this information varied. A breakdown of student scores according to scoring criteria is included in Table 24 below.

Table 24. Task 4 student scores

Scoring criterion	***Score***	**# students achieving this score**
Adds at least three relevant and useful facts, checking for relevance and editing for logic and sequence.	2	5
Adds facts that may be somewhat relevant or useful, does not check for relevance or edit for logic.	1	12
No facts or vague and irrelevant information.	0	5

The table shows that five students added at least three relevant facts and demonstrated some consideration of the ideas through attempts to reword key ideas before adding them to their flag list. Most students (12) added facts that were somewhat relevant, demonstrating a lower level of engagement with the information than their peers. Five students did not access information. An example of this level of engagement was illustrated in Joseph’s fact list:

- On the 28 august 1996, The Governor-general of the commonwealth of Australia.
- Whilst Australia national flag day will not be a public holiday.

- The Australian national flag also flies over Australia seven external territories. (Joseph)

5.1.5 Task 5: Justify source choice

Task 5 required students to include the URL of their chosen website and provide a written justification detailing why their chosen source was appropriate. No students were able to provide a sound justification referring to reliability or relevance. Eight students did not complete this step. A breakdown of student scores according to scoring criteria is included in Table 25 below. The table shows that most participants and were unable to provide a sound justification of their choice of information.

Table 25. Task 5 student scores

Scoring criterion	***Score***	**# students achieving this score**
Includes URL and provides sound justification referring to reliability and relevance.	2	0
Includes URL and attempts to justify demonstrating a basic understanding of reliability and relevance.	1	7
Includes URL with a vague understanding or irrelevant justification or doesn't include URL or description.	0	15

The lowest scores were recorded for this small task, with 15 of the 22 students receiving a 0 for being unable to justify the selection of their chosen source. A small number of students touched on the relevance of their chosen source in their justification. For example, "I choose this because its got lots of information" (Lisa) or in a more content specific manner "I chose this website because it tell a lot about the Australian flag. ☺" (Emma). Six students did make reference to the quality of their chosen source in their justifications. For example, "It's a useful website for studying and for school projects" (John) and "I chose this site because it has a good source of information about the Australian flag and it was easy to read" (Aaron). One student referred to the source as the knower of knowledge, "because it knew a lot about Jamaica" (Joseph). More specifically, four students made some reference to the appropriateness of the source to their level of understanding in terms of being "kid" or "student" friendly. Only one student touched on the notion of integrity, mentioning the use of a government source

without explaining this idea. One other student discussed using their selected source because they had used it for schoolwork before.

5.1.6 Task 6: Write a short report

Task 6 required students to use information collected to synthesise a short report. Most students simply reproduced information by copying and pasting together a description about flags. A breakdown of student scores according to scoring criteria is included in Table 26 below.

Table 26. Task 6 student scores

Scoring criterion	***Score***	**# students achieving this score**
Paraphrases information to write a clear and logical description about flags.	3	4
Paraphrases information to write a short description about flags.	2	6
Reproduces information by copying and pasting together or copying a description about flags.	1	7
No report or report is vague and irrelevant.	0	5

Ten students reproduced information in their short report by copying and pasting together a description of flags; three of these students produced a short report that was vague or irrelevant. For example, "Flags are apart of our life cause it represents our country and who we are" (Karen). Two students did not include a report. Ten students paraphrased information to write a description about flags. Five of these reports were simplistic or considerably short (1-2 sentences), included copied information and lacked grammatical coherence. For example:

> Flags are used for every country and most flags have a meaning on the Australian flag the coulors are blue ,white and red and now I am going to tell you what the meanings of the coulors of our flags mean. Blue means justice or peace. White means purity,or mountain snowmountain and red means blood or purity. (Bonnie)

Four reports, although still short in length, were clearly and logically composed (the errors they displayed were expected given the amount of time provided and the

participants' age), and demonstrated new understanding as well as consideration for the purpose and audience for which the text was being composed. For example:

> Flags go back so far and they have become more than wood or boat signals they have become flags they can symbolise anything that you want it to symbolise. You can take a flag anywhere and you can say with proud voice and say 'this is my flag and I am proud of it' because all flags have something in common they all mean something to some one. (Cal)

5.1.7 Tasks 7-9: Functional tasks

Tasks 7-9 were all functional *accessing information* tasks (Table 20). Students were given explicit instruction on how to complete tasks 7-9, which included: opening the learning object and completing the flag activity; taking a screen shot of the flag they designed in the learning object software; and importing the image into their report document. All students scored 3 points, the maximum possible score, for completing these tasks.

5.1.8 Task 10: Describe and justify flag design

Task 10 required students to describe and justify their flag design using concepts from Tasks 1, 2 and 3 to reframe and expand existing information. Most students were unable to include a sound synthesis of information to justify flag design, instead describing their flag simply. A breakdown of student scores according to scoring criteria is included in Table 27 below.

Table 27. Task 10 student scores

Scoring criterion	***Score***	**# students achieving this score**
Describes and justifies flag design including information synthesised from report.	3	3
Describes flag basically with some synthesised information from report.	2	7
Describes flag basically without synthesising earlier information.	1	9
Doesn't describe flag or description is vague or irrelevant.	0	3

Only three students were able to write a simple description and justify their flag design including information synthesised from their report to demonstrate new understandings. For example:

> My flag background with the red and green represents the land, courage, blood and hardiness. The yellow and gold Australia represents the wealth and the sun shining on the land. This flag represents the country because it shows the reasoning behind Australia. (Harry)

Seven students wrote a short description that included some basic synthesis of information. For example:

> My Australia Flag represents our colour yellow (Gold). I also put the map of Australia on so that people no what Australia looks like and the 5 stars because the colour are very good. I kept my info simple and easy. (Chantelle)

The majority of students simply described their flag. For example:

> The flag is yellowy gold on one side and green on the other side there is a star on the yellow side and there are 3 other ones and one big one in the middle of the green and one the yellow there is Australia out line with green in the middle (Karen).

Three students were unable to provide any description of their flag, or their description was vague and irrelevant. Time may have been a factor for these students, as many students were observed to have poor time management skills throughout the task period.

5.1.9 Task 11: Formatting

The final task required students to format headings, font, style and size to reflect structure and consistency. Most students formatted their document, although inconsistently. A breakdown of student scores according to scoring criteria is included in Table 28 below.

Table 28. Task 11 student scores

Scoring criterion	***Score***	**# students achieving this score**
Selects appropriate headings, font, style and size, and formats document consistently.	2	4
Formats document, although inconsistently and/or inappropriately.	1	14
No evidence of formatting document.	0	4

This table shows that most students were unable to format headings, font styles and size appropriate to purpose, context and audience. The majority of students attempted formatting parts of their document, although this was done inconsistently and inappropriately to context, using a variety of colours and inconsistent font types of 20+ point size. Four students were able to format their document consistently and appropriately.

5.2 Student performance and family background

Student results were analysed against parental occupation data to determine if patterns of ICT literacy achievement existed within the case. The single level indicator of highest-status occupation within the home, based on the Australian Standard Classification of Occupations (ASCO) schema, was used to determine, first, occupation categories and second, broader family background groups, grouped by professional and non-professional occupations. Of the 22 students who completed the ICT task, 15 were from non-professional family backgrounds and seven students were from professional family backgrounds. Analysis of results according to family background groups revealed differences in primary students' school-based ICT literacy. Overall, students from professional family backgrounds demonstrated the strongest performance with an average score of 15.4/23 (67%), while students from non-professional backgrounds, had an average score of 12.9/23 (56%). The highest result was recorded for a boy from a professional family background, who scored 19 out of 23 (83%), and the lowest for a girl from a non-professional background, who scored of 8 out of 23 (35%).

The largest differences in performance between groups were captured across Tasks 3-6, which required students to *access* and *evaluate* information for usefulness; *use ICT*

appropriately by acknowledging and justifying the selection of a chosen source; and *develop new understandings* through the synthesis of collected ideas into a short report. Students from non-professional families generally demonstrated difficulty while performing sub-task 3, which required them to search for and select an appropriate web source. While most students were able to select some relevant keywords they selected the first listed site in the returned search without evaluation. By contrast, students from professional families generally spent time reading items in the returned search and viewing websites before selecting the most appropriate source.

In addition, students from professional families were generally better equipped to select appropriate information within their chosen source and edit this information for logic and sequence. Sub-task 4 required students to add three relevant facts to their flag fact list. Students from non-professional families demonstrated a range of behaviours when adding three facts their list. Most students from this group added facts without checking for relevance or editing for logic or included vague or irrelevant information. Characteristics of performance were also divided when students provided a justification of their source selection (sub-task 5). Four of the seven students from professional families attempted to justify their source selection, demonstrating a basic understanding of reliability and relevance. However, 12 of the 15 students in the non-professional group were unable to complete this sub-task.

Sub-task 6 required students to synthesis the information they had previously collected to write a short report about flags. While most students, regardless of background, received low scores for this task, students from professional backgrounds were generally better able to create a short report and demonstrate some synthesis of collected information compared to their peers. Interestingly, professional family students generally demonstrated a sound ability in paraphrasing collected information, while their peers from non-professional families generally reproduced information by copying and pasting together a description about flags.

The differences, in students' ICT literacy practices described in this paper, illustrated through characteristics of performance, provide a detailed picture of the strengths and weaknesses of case students from professional and non-professional background groups. Overall, students from professional families performed more confidently,

particularly, when accessing and evaluating websites to select an appropriate web source, evaluating this web source to locate relevant and useful information and justifying this choice, as well as when synthesising information to develop new understandings and communicating this understanding in the composition of a short report.

6 Discussion

This study examined students' school-based ICT literacy to address the research questions: "How do Year 6 primary school students perform in terms of their school-based ICT literacy?" and "Is performance associated with family background groups?" The study aimed to provide rich and detailed descriptions of Year 6 students' ICT literacy, including their strengths and weaknesses, while exploring differences in achievement associated with family background. A class of Year 6 students completed a digitally recorded ICT literacy task designed to capture a measure of their ICT literacy as part of their regular class work. The results were analysed according to a scoring rubric that was framed by the six processes of ICT literacy; this allowed for comparison of average performance. The second phase of analysis focused on digital recordings of the students' ICT activity to compare student engagement and behaviour while completing each sub-task. Data was analysed as a whole class; comparisons were then made between family background groups. The findings showed that the average student score was 13.75/23 (60%); this score, along with further examination of student engagement with the processes of ICT literacy, illustrated a generally low level of ICT literacy amongst students.

6.1 Student performance based on ICT literacy processes

Analysis across the six key processes of ICT literacy highlights the variation in the students' ICT literacy. The major patterns of performance across the key processes are presented in Table 31 and discussed below.

Table 29. Student performance across the processes of ICT literacy

Accessing information	• Most students were able to access some relevant information to complete the task. • Students scored highly when launching applications and accessing multimedia resources. • Student scores were varied when identifying and retrieving specific information from web sources. • Students were more confident accessing relevant information from a given source compared with accessing information from their own chosen source.
Managing information	• All students were able to organise and store information for retrieval with assistance from the class teacher and the researcher. • Students demonstrated different processes in organising their information throughout the task, including resizing application windows to view a number of screens at once whilst accessing information, minimising unused applications to the dock, returning to the instruction browser and navigating backwards and forwards using appropriate browser functions.
Evaluating	• Most students demonstrated difficulty evaluating information, scoring lower on average in tasks that included this process. • Many students failed to evaluate information sources for relevance, as they simply copied text into their work without taking any time to read and evaluate. • Students scored significantly low (average 15%) when justifying their chosen website, lacking the ability to demonstrate understanding of reliability or relevance.
Developing new understandings	• Most students reproduced information by copying and pasting descriptions rather than synthesising information • Students who did synthesise new understandings only included short and simplistic synthesis. • A small number of students were able write a sound synthesis for their age group when describing their created flag. • Most students simply described their flag without making any reference or connections to their earlier work.
Communicating with others	• All students compiled reports differently, with little regard for the intended audience or conventions of the text. • Most students selected large font sizes and variety of fonts and colours not usually used in a report format
Using ICT appropriately	• Students used sources without critical reflection or considering social and ethical issues of using someone's work as their own. • Most students were unable to justify their choice of a resource. • Most students selected resources without any evaluation, merely copying and pasting information or typing word for word in their own reports.

In terms of *accessing* and *managing information*, students performed significantly better when they were provided with clear scaffolding and allocated sources of information. Students performed significantly lower for the process *using ICT appropriately*; however, this assessment only briefly covered this process in the form of acknowledging source information. Sub-tasks integrating the processes of *evaluation, developing new understanding, communicating with others* and *using ICT appropriately* required students to use critical and creative higher order thinking to create and share their own information product. Students demonstrated a general low level of performance across sub-tasks integrating these processes suggesting they were more challenging. Though, it is important to note, that the general low level of performance for these tasks could also suggest the task design influenced performance. For example, did the students find the sub-task instructions confusing or were they disinterested in the school-based task? .

Students who demonstrated a lower ability in *accessing* and *managing information* from the *working with information* strand were limited in their ability to *create and share information*. In contrast, students who performed more confidently across the *create and share information* strand demonstrated a sound functional knowledge in terms of *accessing* and *managing information*. This is significant for educators, as low ability in *working with information* seems to affect students' potential to *create and share information*, illustrating the hierarchal nature of ICT literacy skills and processes. This finding is reflected in a number of large-scale measures of ICT literacy that collectively highlight the conditional nature and increasing complexity of ICT skills and competencies encompassed in the broader construct of ICT literacy (Claro et al., 2013; Jun et al., 2012; Kim & Lee, 2013; van Deursen & van Diepen, 2013). Additionally, not all students who demonstrated a sound knowledge of *working with information* were able to demonstrate confidence to *create and share information*; this illustrates that simply possessing basic skills and knowledge does not necessarily translate into higher order skills. This finding is mirrored in several international studies that indicate that possessing basic ICT skills does not result in formal ICT literacy; instead, students require explicit instruction to develop these higher order skills (Colwell et al., 2013; Jun et al., 2012; van Deursen & van Diepen, 2013).

When considering the results of this ICT literacy task it is also important to consider the impact of traditional literacy skills on student performance. As ACARA (2015) acknowledges the six processes of ICT literacy are closely associated with traditional information literacy skills. For example, the ability to decode and encode text for meaning when *accessing information* and *developing new understandings*, raising questions about the role of academic ability upon students' ability to engage with the ICT task. Much academic research from a literacies perspective has focused on the link between traditional literacy and new digital texts, asserting that while basic literacy is essential reading on the Internet is different, extending the skills required to decode traditional texts (Coiro, 2003). While it was beyond the scope of this research study to collect students' general literacy performance data the impact of this relationship upon students' ability to demonstrate ICT literacy is a significant area for further investigation.

6.2 Patterns of performance based on students' socioeconomic status

In addition to understanding the profile of students' ICT literacy, it is important to know the extent to which variations are associated with other factors. Differences in this measure of school-based ICT literacy became evident based on students' family backgrounds. Overall, students from professional family backgrounds scored on average 10 percentage points higher than their peers from non-professional families. This finding is similar to a number of recent studies measuring ICT literacy (ACARA, 2012b; Claro et al., 2012; OECD, 2010; Ritzhaupt et al., 2013), which suggests that differences among socioeconomic groups in terms of ICT literacy are of concern and warrant further investigation.

A more detailed analysis of the differences in ICT literacy amongst students revealed key differences in characteristics of performance. These differences in performance between non-professional students and their peers from professional family backgrounds were most evident when students were working on higher order *creating and sharing information* tasks. More specifically, these included *evaluating* information usefulness to select a source, locate appropriate information and justify choice of information choice; *developing new understandings* through the synthesis of ideas; and *communicating with others* by reshaping this synthesis into a report. This indicates that

while differences in ICT literacy were evident in all six processes, the greatest differences were seen when performing higher order thinking tasks. This finding suggests that in general students from professional families demonstrated greater achievement at a wider variety of ICT literacy processes, including higher order processes for *creating and sharing information*. Such differences reflect an increasing level of digital inequality in line with the increasing complexity of the processes of ICT literacy (van Dijk, 2005).

These findings raise questions about the differences in ICT experiences of children from professional and non-professional families. Specifically, what kinds of ICT practices and experiences in professional families lead to stronger school-based ICT literacy than non-professional families? A number of studies examining home ICT practices have suggested that such inequalities in ICT literacy achievement are associated with access to economic, social and cultural resources or are simply part of a broader process of social reproduction (OECD, 2010; Smith et al., 2013). Others provide empirical evidence of a range of family factors that that can lead to varied ICT practices and possibilities, including parents' exposure to ICT practices through their working lives, academic orientation, value for school-based ICT practices, socialisation into computer practices and opportunities to develop ICT literacy (Hollingworth et al., 2011; Livingstone et al., 2011; Samuelsson, 2012; Tondeur et al., 2011).

6.3 Limitations

Given the isolated nature of the ICT literacy task as an assessment of proficiency, this study has only captured one measure of what the students were capable of in terms of ICT literacy, as defined by the Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA, 2010), for one moment in time. It is acknowledged that assessing one measure of ICT literacy captured data representative of one performance, which may potentially not be a true representation of students' actual ability as well as excluding a range of other ICT practices. However, the focus of this study was to provide rich qualitative detail of students' school-based ICT literacy performance to enrich large-scale assessment data also collected in one off National assessments of ICT literacy. It was also considered how the formal nature of the ICT task design might have lead to low engagement or 'boredom' for some students

resulting in low performance not representative of typical skills and knowledge. However, a number of measures were taken to overcome such engagement including the integration of task design into regular class work and collaboration with class teacher in design, data collection and analysis stages of the research to ensure measures were authentic and typical of students' regular class engagement. While students were allocated scores according to their performance in the sub-tasks, the task itself was not designed as a quantitative measure of ICT literacy. Instead, the purpose of the assessment was to capture the details of students' ICT literacy performance while engaged with the processes of ICT literacy to complete an authentic school-based task. Scores were allocated to allow comparison between students but were not analysed to determine statistical significance. However, similarly designed tasks are used in Australian schools as part of the National Assessment of ICT literacy, and rather than being definitive of practice, this data was used along with digital recordings of process while completing the task to glean a more considered and holistic understanding of students' school-based ICT literacy that goes beyond the allocation of a test score.

7 Conclusion

This study examined a class of 22 Year 6 upper primary students' school-based ICT literacy. The study aimed to provide in-depth descriptions of Year 6 students' ICT literacy, including measures of process as well as product, while exploring differences in achievement associated with family background. The findings showed that students' ICT literacy was varied. Students received the weakest scores when completing higher order critical and creative thinking tasks such as *evaluating*, *developing new understandings* and *communicating with others*, and the strongest scores when completing low-level tasks such as *accessing* and *managing information*. Students who performed poorly in low-level functional skills tasks were limited in their ability to perform critical thinking tasks. However, functional skills did not necessarily ensure higher order critical skills.

Differences in students' ICT literacy associated with family background were also evident within the case. When comparing average scores, students from professional family backgrounds outscored their peers from non-professional families across all

tasks. This is consistent with the current literature and typical of the well-documented digital divide (ACARA, 2012b; Claro et al., 2012; OECD, 2010; Ritzhaupt et al., 2013). Further, differences in performance were recorded for sub-tasks underpinned by critical and creative higher order processes of ICT literacy. Students from professional families outscored their peers when *evaluating, developing new understandings* and *communicating with others,* indicating that the digital inequality between students from professional and non-professional families increases with the complexity of the process of ICT literacy. This suggests that students from professional family backgrounds may have access to different support and resources that enable this type of ICT literacy compared with their peers from non-professional backgrounds. Such a finding highlights the real potential of a students' background to either constrain or enable school-based ICT literacy.

This understanding of the variation in students' ICT literacy, including the processes in which students from professional families outperformed their peers, provide educators with details of the real complexity of students' ICT literacy. Overall, these findings suggest that while all students would benefit from the further development of ICT literacy at school, targeted instruction and exposure to critical and creative ICT literacy practices is particularly important for students from non-professional backgrounds who may not experience these types of ICT literacy at home. Such an understanding provides educators with a foundation to better tailor curricula in the design of targeted learning experiences that facilitate the development of ICT literacy for all students and address the digital inequalities in the classroom. As other research suggests, skills training in context of economic, social and cultural inequalities is important in achieving digital inclusion (Helsper & Enyon, 2013). The findings also suggest several new directions for research. First, a detailed exploration of students' ICT experiences within their home context is needed to better understand the types of factors within socioeconomic groups that may contribute to digital inclusion or exclusion. Second, an investigation of these home ICT experiences together with school-based ICT literacy would enable a better understanding of how such experiences are negotiated across home and school contexts to shape children's and young people's ICT literacy.

8 References

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CHAPTER SIX

"Well, not all kids are experts with technology": Primary school students' explanations of their ICT literacy practices

Prepared for submission to Computers and Education as: Apps, T., Agostinho, S., & Bennett S. Well, not all kids are experts with technology: Listening to primary students talk about their ICT literacy practices

Chapter Six provides details of students' ICT literacy practices from the perspective of six embedded participants. The paper focuses on questionnaire and ICT literacy task data from the Phase 1 of this study, together with students' reflection interviews from Phase 2. The purpose of this paper is to explore students' digitally recorded ICT literacy task in context of their ICT experiences. Such a focus draws attention to the complex sociocultural nature of students' ICT literacy, specifically highlighting the range of individual characteristics, support and resources that shape ICT practice. As part of the thesis this chapter provides an in-depth exploration of the ICT literacy practices and engagement of six embedded participants from their own perspective, and helps to answer Research Questions 2, "How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?" and 3 "What is the relationship between a Year 6 primary school student's family background and their school-based ICT literacy practices?" As a stand-alone paper, it adds to the literature by exploring the links between primary students' actual school-based ICT literacy task and their home ICT experiences, and provides details about factors that can lead to digital inclusion or exclusion. This in-preparation manuscript has been prepared for submission to *Computers and Education*, which was selected as the target journal for this paper as it is a highly ranked education and educational research journal that aligns with several of the paper's key themes, including computing and communication technologies, social issues and curriculum considerations in a primary school educational context.

1 Abstract

Assessments of ICT literacy indicate that most young people use ICT in a relatively limited way, with varying patterns of ICT literacy linked to students' family background. Within this context, this study aimed to better understand the family background factors that influenced the school-based ICT literacy of six Australian children in their final year of primary school. Drawing from a larger case study of one primary school class, six students were selected to represent a variation in ICT literacy practices captured in a school-based ICT literacy assessment task. Data was collected through a questionnaire about students' home ICT experiences, a digitally recorded ICT literacy task and semi-structured reflective interviews during which students discussed their ICT literacy performance in the context of their previous ICT experiences. The paper presents detailed descriptions of the school-based ICT literacy of students, highlighting their perspectives in exploring and explaining these practices. A Bourdieuian lens is used to explore the sociocultural nature of primary students' ICT literacy practices. The findings contribute to our understanding of the fundamental role of parents, siblings and teachers in structuring ICT practice.

2 Introduction

Much significance has been placed on the development of 21st-century learners and citizens in the current education climate. Such aspirations appear in policy documents and curricula across OECD countries, with particular importance placed on the development of ICT literacy, seen as essential for participation in contemporary society (OECD, 2010). In this context ICT literacy is related to the ability to complete tasks and processes requiring certain skills and knowledge. Operationalised as the ability to use "digital technology, communication tools and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society" (IICTLP, 2007, p. 2). Such a definition highlights both technical skills and a number of complex cognitive processes associated with ICT literacy. For example, notions of integrating, evaluating and creating information are far from basic technical skills, instead requiring students to engage in critical cognitive skills and higher order thinking.

By contrast, the academic discourse concerned with the theoretical, ideological and political nature of defining what it means to be digitally literate is complex and at times

conflicting. This, most simply, is demonstrated through the variety of terms used to describe individual's engagement and practice with technology including: digital literacy, digital literacies, ICT literacy, media literacy, new media literacy and multi-literacies. Each conceptualisation underpinned by a different research tradition with its own stake in the field for defining the digital (Livingstone, 2008). Yet, commonly the academic discourse is critical of operational definitions of ICT literacy, which tend to sideline the myriad of social practices associated with ICT practices (Buckingham, 2008). As Lankshear & Knobel (2008) suggest the way ICT or digital literacy is understood has real implications for policy and curriculum, which translates into classroom practice shaping children and young peoples ICT possibilities.

The emerging evidence from research into young people's experiences with ICT depicts a complex picture of students as technology users, highlighting a considerable diversity in technology use. Assessments of ICT literacy indicate that most young people use ICT in a relatively limited way (ACARA, 2012b; MCEEDYA, 2010; MCEETYA, 2007; OECD, 2010), with varying patterns of ICT literacy linked to socioeconomic status, resulting in a divide in ICT achievement that has been referred to as a second level digital divide. The OECD formally defines the emerging digital divide as "the gap between individuals, households, businesses and geographic areas at different socioeconomic levels with regard to both their opportunities to access information and communication technology and to their use of technology for a wide variety of activities" (OECD, 2010, p. 8). This goes beyond a digital divide in *access* to technology, now regarded as the first digital divide. Indeed, it has been because of initiatives to provide equity of access and increases in technology affordability that the emergence of a second digital divide has become evident (Venezky, 2000). Thus, an understanding of the digital divide has evolved from a focus on access to physical computers to a focus on social inclusion and 'effective access' to the digital world. Patterns of effective access described by the digital divide have been associated with parental occupation and education, geographical location, gender, ethnicity and indigenous status (Fraillon, 2012; OECD, 2010). Furthermore, regardless of policy agenda and government investments, such patterns remain consistent (ACARA, 2012b; Fraillon, 2012). Such patterns of digital inequality reveal the social and cultural complexity of ICT literacy, while raising important questions about how and why these inequalities continue to be reproduced.

Research investigating young people's experiences with technology demonstrates how differences in ICT practices, preferences and skills related to family background tend to simply reflect broader processes of social reproduction between advantaged and disadvantaged family groups (Ahn, 2012; Tondeur et al., 2011; Vekiri, 2010). However, a number of researchers have shifted away from this binary view, focusing on individual and contextual factors that contribute to differences in young people's ICT experiences. Key findings from this body of work highlight a range of family factors that contribute to a young person's ICT skill and knowledge, including: access, home sharing, available support, home and school connections, orientation, motivation and approach towards ICT, parental regulation, practice and rehearsal and confidence (Barron, Walter, Martin, & Schatz, 2010; Eynon & Malmberg, 2011; Eynon & Malmberg, 2012; Gronn, Scott, Edwards, & Henderson, 2014; Robinson, 2014a; Robinson & Schulz, 2013).

Within this context, a number of studies concerned with understanding school students' ICT practice through a Bourdieuian lens illustrate the potential of a sociological framing to provide a deeply situated understanding about why and how digital inequalities occur (Beckman et al., 2014; Cranmer 2006, Hollingworth et al. 2011; Johnson, 2009b; Kapitzke, 2000; North et al., 2008). For example, employing the theory of practice as an empirical tool to understand the social and cultural milleu in which secondary students ICT practices occur (Beckman et al., 2014). The application of habitus to examine the relationship between secondary students digital taste and class (North et al, 2008) and the application of capital to investigate family practices influence young peoples perceptions of and approaches to the use ICT for learning (Cranmer 2006, Hollingworth et al. 2011). These studies draw attention to both external and internal factors that structure ICT practice, including the reproductive nature of schooling as well as the generative nature of an individual's habitus. While the findings provide general details about the contextual factors that structure and generate a young person's ICT practices, there is a paucity of this kind of research in the primary school context, as well as no research that specifically applies a Bourdieuian framework to understand students' own explanations of their school-based ICT literacy performance within this setting. This study addresses this gap by advancing knowledge of primary students' school-based ICT literacy, from their own perspectives, employing a Bourdieuian lens to uncover

structuring and generative factors that come to enable or constrain school-based ICT literacy.

This paper explores the ICT literacy of six case students captured in a digitally recorded school-based assessment task and discussed during semi-structured student reflective interviews. The paper outlines the guiding theoretical framework, followed by details of data collection and analysis. The findings are then presented in two parts: first, a brief introduction to each individual case student, including descriptions of ICT task performance, followed by the students' explanations of their practices during key activities within the task. A theoretically grounded discussion of these practices and students' negotiation of ICT practice between home and school follows. The implications of these findings are then discussed, including pedagogical implications for teachers and policy makers.

3 A Bourdieuian lens to understand ICT literacy practices

Educational technology research is commonly criticised for being atheoretical in nature. Focusing on the processes of improving teaching and learning, while inadvertently sidelining the social nature of technology. Differently, sociological and media research that is concerned with ICT and young people have been framed by several anti determinist theories, for example, social construction of technology (SCOT) and by extension domestication theory. Each paying attention to the organisational, political, economic and cultural factors that pattern the design and implementation of a technology (Selwyn, 2008). Yet, limitations of such theories to understand school-based ICT literacy practice include: the focus on industry and design; focus on agency with a narrow contribution to understanding structure; and limited application to school contexts (Klien & Klienman, 2002; Williams & Edge, 1996).

More broadly, Bourdieu's theory of practice offers a sociological lens for understanding the economic, social and cultural contexts that presuppose social practices. A small number of researchers have applied Bourdieu's constructs to understand school students ICT practices and experiences, demonstrating the potential of the theory to as a conceptual, methodological and analytical tool for understanding both structure and

agency (Beckman et al., 2014; Cranmer 2006, Hollingworth et al. 2011; Johnson, 2009b; Kapitzke, 2000; North et al., 2008). Beginning from a view of technology as a social tool this educational technology study employed Bourdieu's theory of practice, together with Selwyn's further conceptualisation of technological capital. These concepts provided a lens at both the methodological and analysis stages to understand the particular positioning of families, the individuals within those families and the strategies they adopted that worked to constrain or enable ICT literacy practices.

The relationship between the key concepts of Bourdieu's Theory of Practice are often represented by the following equation: [(habitus) (capital)] + field = practice (Bourdieu, 1984, p. 101). Practice refers to both observable and unobservable actions and behaviours. Habitus refers to the dispositions that shape individuals to become who they are, and yet also includes the conditions of existence, which are displayed every day in their relations to society in and through individual activities (Bourdieu, 1990). Fields, according to Bourdieu, are networks of social relations, structured systems of social position within which struggles or manoeuvres take place over resources, stakes and access (Bourdieu, 1990). The field operates like a 'game' in which agents adopt strategies in competition with others to gain the stakes. All play the same game, though not necessarily consciously so (Thomson, 2012).

Capital acts as a social relation within a system of exchange, and the term is extended to all goods, symbolic and material, that are rare and worthy of being sought after in a particular social form (Webb, et al., 2002). This study focuses on Selwyn's (2004) conceptual application of three forms of capital – economic, social and cultural – to the practice of technology use, detailed below. This characterisation of technological capital, as both a subset and an addition to Bourdieu's capital (Selwyn, 2004), provides a useful empirical lens for exploring children's and young people's ICT literacy practices:

- Economic capital: material exchanges, material resourcing, domestic space of ICT use, economic capacity to purchase ICT hardware and software;
- Social capital: networks of 'technological contacts' and support, both face-to-face and online; and
- Cultural capital considered in three forms: *institutionalised*, referring to formal

> education or training; *embodied*, referring to investing time in self-improvement of ICT skills, knowledge and competencies in the form of informal learning; and *objectified*, referring to socialisation into technology use and 'techno-culture' via techno-cultural goods, family, peers and other agents of socialisation (p. 355).

Importantly, objectified cultural capital is different from other capitals as accessing or possessing objectified cultural capital may not automatically translate into a habitus, for example possessing techno-cultural goods cannot simply be exchanged for ICT literacy or a techno-orientated habitus (Moore, 2012). Understanding capital in this way is a useful starting point in recognising the mediating role of such resources in shaping a young person's ICT literacy, as all forms of technological capital are accumulated and potentially exchanged for the symbolic capital of ICT literacy. This exchange occurs within a social and cultural context, and the dynamic interaction between individuals (habitus) and the surroundings in which they find themselves (field(s)) is important for understanding ICT practices (Mills & Gale, 2007). Thus, an understanding of the ways in which family background may structure primary students' school-based ICT literacy practices also requires an analysis of habitus and field. As with the characterisation of technological capital, habitus and field can also be conceptualised with reference to technology practice. In this study, technological habitus is understood as a student's personal disposition toward the use of or experiences with technology, and the objective conditions of a student's home field that work to structure ICT practice include the family culture of technology use, rules surrounding use and positions within the family.

Employing Bourdieu's theory of practice to provide in-depth analysis of primary students' school-based ICT literacy extends previous investigations of school-aged students' ICT literacy (ACARA, 2012b) and conceptual work exploring the complexities of ICT practices (Helsper, 2008; Selwyn 2004; Servon, 2008; Warschauer, 2002). However, Bourdieu's work is often criticized as being deterministic. Offering an understanding of practice as being objectively structured leaving little room for understanding individual agency and transforming practices. However, a number of empirical studies illustrate the opposite, drawing attention to the intersection of habitus, capital and field to explain the role of agency beyond objective structures upon an individuals ICT practice (Bulfin & North, 2007; Kapitzke, 2000). Such work enriches the academic discourse surrounding Bourdieu's theory of practice by addressing

criticisms of determinism while illuminating the transformative potential in the empirical application of Bourdieu's constructs. To uncover details of structure and agency in shaping ICT practices that may better inform the design and examination of critical targeted and meaningful learning experiences, which work to address, rather than reinforce, digital inequalities

Theoretically, this research makes a novel contribution by examining the primary students' own explanations of their school-based ICT literacy in relation to their habitus, technological capital and home fields. This is a new area of empirical work as the existing body of research that employs Bourdieu's theoretical constructs focuses on understanding ICT practice rather than specific measures of school-based ICT literacy performance. While large scale data details distinct patterns of school-aged children's ICT performance (ACARA, 2012b, OECD, 2010), the qualitative application of the theory of practice offers a conceptual, methodological, and analytic tool capable of providing rich qualitative description to uncover the myriad of contextual characteristics that can contribute to such diversity.

In sum, the theory of practice, as a methodological tool, provided a framework for the types of data, activities and questions that had the potential to provide a clearer picture of students' ICT literacy practices. As an analytical tool, the framework allowed for themes and patterns to be coded accordingly and students' backgrounds to be mapped so as to illustrate the dynamic interaction (capital exchange) between participants (habitus) and the surroundings in which they find themselves (field(s)). Such an approach allowed researchers to identify the effect of the different forms of capital and objective field conditions on the ability of individuals and groups to make meaningful use of ICT, as suggested by Selwyn (2004). Further details of the study's method and approach to data analysis are explained below.

4 Methodology

This paper focuses on the school-based ICT literacy of six students captured during a school-based ICT literacy task, which was digitally recorded and discussed with students afterwards. Data was collected in the form of questionnaires about students'

home ICT experiences, digital recordings of the ICT literacy task and post-task semi-structured reflective interviews. The study was guided by the following research questions:

- How do primary students perform in terms of their school-based ICT literacy?
- What factors influence primary students' ICT literacy practices?

The six participating Year 6 students were from one average Australian public school. They were purposively selected from the broader case of 28 students following the completion of a questionnaire and a digitally recorded ICT literacy task. The six students represented a range of ICT literacy practices observed within the digitally recorded ICT literacy task data, as well as a range of task scores (low, average and high). These key sampling characteristics are illustrated in Figure 4.

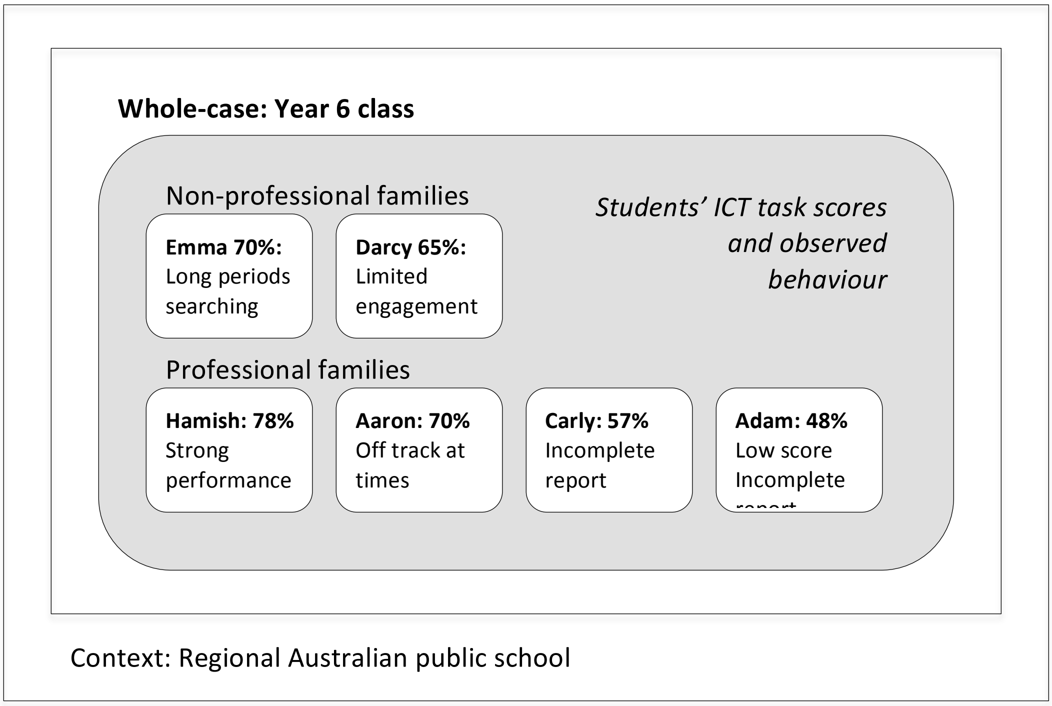

Figure 4. Six selected students' sampling characteristics

The selection of students based on variation in performance (processes and scores) resulted in an uneven distribution between family backgrounds and the inclusion of two participants from non-professional families whose performance was not typical of patterns of performance associated with large scale assessments of ICT literacy.

4.1 Context of this study

In Australia, national educational goals place considerable importance on the role of schooling in developing students' ICT literacy. The Melbourne Declaration states that "in this digital age young people need to be highly skilled in the use of ICT" (MCEETYA, 2008, p. 9); almost 10 years earlier, the Adelaide Declaration had stated that "when students left school they should be confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society" (DETYA, 2000, p.41). Most recently, the Australian Curriculum identified ICT competence as one of the seven general capabilities that will help students to live and work successfully in the 21st century (ACARA, 2012a).

In an Australian school context, ICT literacy is defined as "the ability of individuals to use ICT appropriately to access, manage, integrate and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society" (MCEETYA, 2007, p. 3). ICT literacy is measured every three years in a national sample assessment of Year 6 and Year 10 students as part of the National Assessment Program. Results from the first three cycles of assessment, which commenced in 2005, indicate that Australian school students are achieving generally low levels of ICT literacy (Fraillon, 2012). While positive changes in overall literacy levels have been recorded between 2008 and 2011, patterns of ICT literacy associated with family background have remained constant (ACARA, 2012b; MCEEDYA, 2010; MCEETYA, 2007). The most recent assessment report indicates that 50% of Year 6 students with parents in the 'unskilled manual, office and sales' occupational groups attained the proficiency standard, compared to 79% of students with parents from the 'senior managers and professionals' occupational groups (ACARA, 2012b). These findings, coupled with an ICT-driven education-policy agenda, raise questions about Australia's current educational practice and ICT pedagogy at a school and classroom level, including how inequalities are reproduced; and why general learning gains aren't greater given the significance of ICT literacy as a critical skill in 21st-century society.

4.2 Data collection

Data presented in this paper was collected across two phases during one school term. Phase 1 consisted of a questionnaire about students' ICT experience and a school-based ICT literacy task, and was completed by one class of Year 6 students in their final year of primary school. Phase 2 consisted of semi-structured reflective interviews with six of the study's participating students, who had been purposively sampled from the class. All data collection tools and strategies implemented for this study were designed through consultation and collaboration with the class teacher. This process allowed each phase of the study to be integrated into the regular class program, allowing for the collection of data in a naturalistic setting.

4.2.1 Phase 1

Phase 1 of the study was designed to collect data about students' backgrounds in terms of their ICT experiences, along with their school-based ICT literacy. An open-ended questionnaire was created to collect background information about students' home ICT experiences including family members, parent occupation, students' ICT preferences, self-efficacy, learning experiences and available resources and support (Appendix E). The questionnaire consisted of two parts; the first focused on students' ICT practice and experience and the second focused on family. Students completed the first part of the questionnaire at school and the second part at home with the participation of family members as part of their weekly homework task. This strategy ensured that family members checked student data for accuracy.

In a subsequent lesson, students completed a two-hour ICT literacy task designed to assess their school-based ICT literacy. The task focused on the six key processes of ICT literacy measured in the Australian National Assessment Program: accessing information, managing information, evaluating, developing new understandings, communicating with others and using ICT appropriately (ACARA, 2012b; MCEEDYA, 2010; MCEETYA, 2007). An ICT literacy task, Design a Flag, was created as a website and used standard software applications including Microsoft Word and web browsers. The ICT processes and functions of the task were initially designed by the researcher. Consultation with the class teacher then allowed the design to be customised to fit curriculum outcomes for the class and integrated as part of the class unit of work. The ICT literacy task comprised 11 sub-tasks separated into two parts: Part A: Working with

information; and Part B: Creating and sharing information. Each of the 11 sub-tasks was underpinned by one or two processes of ICT literacy (Table 32). Part A required students to collect information about flags and symbolism from two teacher-selected sources and another that they selected independently, and synthesise this information into a short summary report. Part B required students to create a flag to symbolise Australia, and finally describe and justify their design.

Table 30. Design a flag – ICT literacy task summary

	Task	ICT literacy process*	Description
Part A: Working with information*	1. Getting started	Accessing information Managing information	Follow a set of simple instructions to access the ICT task web page, open a Word document, organise document structure and save/store the file in correct location with the appropriate file name for retrieval and reuse.
	2. Flag facts	Accessing information Evaluating	Use links to navigate to a website to compile a list of important facts within the Word document. Identify and retrieve information from the chosen source while making judgements regarding the relevance and usefulness of the information to their needs.
	3. Selecting a source	Accessing information Evaluating	Use a search engine to select an appropriate website to add additional information to the list of facts.
	4. Locate appropriate information	Developing new understandings	Access information from the selected source, adding at least three relevant and useful facts, checking for relevance, paraphrasing and editing for logic and sequence.
	5. Justify source choice	Evaluating Using ICT appropriately Communicating with others	Include URL and detail why the chosen source is appropriate. Make judgements regarding the integrity, relevance and usefulness of information.
Part B: Creating and sharing*	6. Write a short report	Developing new understandings Communicating with others	Use information to synthesise a short flag report, creating new information and knowledge by synthesising, adapting or authoring to suit audience, context and medium.
	7. Functional task: learning object	Accessing information	Open the learning object and complete the activity.
	8. Functional task: screen shot	Accessing information	Take a screen shot of the flag image.
	9. Functional task: import image	Accessing information	Import the image into the Word document.
	10. Describe and justify flag design	Developing new understandings Communicating with others	Describe and justify the flag design using concepts from tasks 1-3. Reframe and expand existing information to create an information text to suit audience, context and medium.
	11. Formatting	Managing information Communicating with others	Format headings, font, style and size to reflect structure and consistency.

* Processes and strands defined in the Australian National Assessment Program of ICT Literacy (MCEETYA, 2007)

Students completed the ICT literacy task in a computer laboratory during a two-hour morning session. Data was collected as each student worked on the task using screen recording software (Debut), which captured students' actions on the computer. The completed student work was collected in electronic form. Upon completion of the ICT literacy task, preliminary analysis of task data was conducted to select the six students to participate in Phase 2 of data collection. These six students are the focus of this study. Analysis occurred immediately after completion of the task to allow interviews to be conducted the following day. Prompt analysis and selection of students was critical to ensuring that the task remained clear in students' minds. The ICT literacy tasks were scored according to a scoring rubric. These scores, together with analysis of printed artefacts and screen recordings, were used to select six students representative of a range of scores and ICT literacy practices.

4.2.2 Phase 2

The second phase of the study consisted of semi-structured student reflective interviews, and was designed explore students' understanding of their ICT literacy practices. The aim of the interviews was to provide a deeper understanding of a student's engagement, or otherwise, with the computer, computer software and the Internet, while completing the school-based ICT literacy task. Students were played the screen recordings of selected segments of their ICT task during the interviews to stimulate reflection about their knowledge, skill level and thought processes during the task period. Students' completed work was also used to initiate and guide dialogue. A similar approach was successfully used with children as part of the Learner Experience of e-Learning project in Glasgow (Mayes, 2006). The aim of such an approach is to reveal cognitive processes that are not usually evident using other methods (Edward-Leis, 2006). In this way, digitally capturing the ICT task for further analysis and elicitation of students' perspectives as a stimulus for reflective interviews allowed analysis of both the product and process of the task, and provided students with an opportunity to contextualise these outcomes within their broader ICT experiences.

Semi-structured reflective interview guidelines were tailored for each student, focusing on a range of their observable behaviours during the task. Interviews were digitally recorded, transcribed and systematically analysed in two stages. The first stage focused

on mapping student ICT task data against interview transcripts. A constant comparison technique (Strauss, 1987) was then employed whereby data was initially coded according to emerging patterns and themes within and across students. After this, categories were identified directly relating the concepts of habitus, capital and field, and were coded in the second stage of analysis. This data was then pooled to create summaries for each student according to the theoretical constructs. These summaries were added to technology profiles, within which all data sources were converged to create profiles of ICT experience that provided rich contextual descriptions of students' ICT literacy practices and allowed comparisons between students.

5 Results

Students exhibited a range of practices and strategies while engaging with the ICT literacy task. Results are presented with a brief introduction to each case student including details of their ICT literacy performance collected during Phase 1 of the study. This is followed by the students' explanations of their practices during key activities within the ICT literacy task collected during Phase 2.

5.1 Phase 1 – Case students and their school-based ICT literacy

5.1.1 Aaron

Aaron comes from a professional family background. He lives at home with his mother, father, two older sisters and younger brother. Aaron's father works as a pathologist and his mother is studying at TAFE (Technical and Further Education) whilst job-seeking. Aaron's sister taught him how to use the computer, as did the school librarian. When he requires support with technology he asks his sister first, followed by his father. Aaron rated himself 5 out of 10 when he was asked to make a judgement about his ICT ability.

Aaron scored 70% for his ICT literacy task, above his class average score of 60%. When working on the task, he accessed both teacher-provided sources, although he only used information from the Enchanted Learning site. Aaron copied exactly from this source into his fact list. When selecting his own source he modified his search terms three times, beginning with 'Flagfacts' followed by 'Info about flags' and finally 'Info

about the Australian flag'. Aaron selected the first link in this final search. He then located some appropriate information within the source, copying and pasting three relevant facts. Aaron was able to justify the choice of his source: "I chose the site because it has a good source of information about the Australian flag and it was easy to read." He then adapted the information he had collected to write a short report. After completing the report, Aaron accessed the learning object and began to read the provided historical information; however, he did not finish before moving on to design his own flag without accessing the instructions. After finishing his flag, Aaron imported a screen capture of the design into his document and wrote a simple description, demonstrating some understanding of colour and symbolism. Aaron spent some time reading over his work upon completion. He prepared his document for submission by applying some formatting, although this was not consistent.

5.1.2 Adam

Adam comes from a professional family background. He lives at home with his mother, father and younger brother. His mother works as an accountant and his father is a sales representative. He learnt to use the computer through experimentation and from his school teacher and father. Adam describes his parents' ICT use as limited. He rated himself 6 out of 10 when asked to make a judgement about his ICT ability.

Overall, Adam scored 48% for his ICT literacy task, the lowest student score. Adam began the task by collecting information for his list of flag facts. To do this he accessed both teacher-provided sources, although he only used information from the Enchanted Learning site. Adam copied exactly from this source into his fact list. When conducting his own search, Adam used Google, modifying his search terms three times, including two general searches using the search terms 'flags' and 'flags of the world', followed by a more focused search using the search term 'Australian flags'. Adam spent some time following links on the first page of results after each search, before finally selecting the third link from his final 'Australian flags' search. He included two facts, copying exactly, from this selected source. Adam provided no justification about the choice of this source. He wrote one sentence for his short report without any reference to his collected information before moving on. When he accessed the learning object he read all of the historical information and instructions before commencing the flag design

activity. After finishing his flag design, Adam imported a screen capture of his flag into his document; however, the allocated task time elapsed before Adam could write a description of his design. Adam was the only individual case student who did not complete the ICT literacy task.

5.1.3 Hamish

Hamish comes from a professional family background. He lives at home with his mother, father and younger sister. Hamish's parents both work as chemical engineers Hamish describes learning to use the computer from his parents and through experimentation. He also discusses watching his mother working at home when he is bored. When Hamish requires support, he asks his father, whom he considers highly skilled with ICT. Hamish rated himself 6-7 out of 10 to describe his ICT ability.

Of the six students, Hamish achieved the highest score, 78%, for his ICT literacy task. When working on the task he began by collecting information for his list of flag facts. Hamish accessed and used both teacher-provided sources, copying information directly into his fact list by dragging and dropping. When conducting his own search he dragged and dropped keywords from ICT literacy task site into the search engine. Hamish selected the first link and skimmed the page with his cursor briefly before navigating back to the search. He then added 'for kids' to his original keywords and ran the search again. Hamish selected the first source, which he skimmed briefly and then stopped to read. He located three appropriate facts within this source, dragging and dropping information directly into his flag fact list. He was able to justify the selection of his web source, explaining that it was reliable as it was a site he had used before because teachers at school had recommended it. Hamish then used his collated flag fact list, adapting and re-authoring information to create a short report. Once the report was complete, he deleted any remaining copied text. Next, he accessed the learning object and read both the historical information and instructions before designing his own flag. After finishing the flag design, Hamish imported a screen shot of his design into his document and wrote a simple description, demonstrating new understanding of colour and symbolism. He read over his work and manually corrected errors highlighted by the word processing software.

5.1.4 Carly

Carly lives at home with her mother, father and older brother. She comes from a professional family background. Her father works as a business banker and her mother works as plant material supplies officer. Carly's older brother and mother taught her how to use the computer, and she can ask them both for help if she has a problem. She also includes the school librarian as a source of learning. Carly rates herself 5-6 out of 10 when she was asked to make a judgement about her ICT ability, explaining that if she used technologies more she would be able to "learn much more about technology".

Carly scored 57% for her ICT literacy task, below the class average of 60%. When working on the task, she began by collecting information for her list of flag facts. While collecting this information, Carly accessed and used both teacher-provided sources, copying exact information into her flag fact list. She followed an advertised link embedded in the second source, navigating away from the web page, although she returned immediately using the back button within the browser. Carly was the only student to follow an advertised link during the task. When conducting her own search she used Google and ran one search with the keywords 'Australian flag', from which she quickly selected the second link. Carly spent time reading and evaluating information within this source, highlighting relevant chunks of information with her cursor and copying them exactly into her document. She was able to provide a general justification about the selection of her web source: "The reason I chosen this website because it had a great source of information for people to use." Carly then began to copy and paste from her fact list to create a short report. Following this she began manually correcting errors highlighted by the word processing software. Carly stopped this process mid-way through and moved on to the learning object. Next, she accessed the learning object and began to design a flag without reading any historical information or accessing the instructions. After finishing her flag, she imported a screen shot of her design into her working document and wrote a simple description. She prepared her document for submission by applying some formatting and a header with her name.

5.1.5 Darcy

Darcy lives with her mother, father and two older sisters. She comes from a non-professional family background, her father works as a traffic controller and her mother

as a shop assistant. She learnt to use the computer from her oldest sister and the school librarian. She asks her sisters first, then her father when she requires ICT support. After some reflection, Darcy rated herself 5-6 out of 10 when describing her ICT ability.

Darcy scored 65% on her ICT literacy task, slightly above her class' average score of 60%. When working on the task she accessed and used both of the teacher-provided sources, immediately copying and pasting information from the first page of both sources without reading. Darcy was the only student to copy information without spending any time reading. When searching for her own source, Darcy used Google first to locate the search engine kids.net.au (an Australian not-for-profit portal linked to reviewed and categorised age appropriate websites). Using kids.net.au, Darcy conducted one keyword search using the search term 'the Australian flag and it's history'. She selected the first non-advertised link from the search results and again copied and pasted the first page of information without reading or evaluation. Darcy justified the selection of her source in terms of audience suitability and because she had used it previously in class. Next, she accessed the learning object, reading all of the historical information before designing her own flag without accessing instructions. She then imported a screen shot of the flag into her document and wrote a simple description of her design. Darcy formatted her document throughout the task, although the formatting was inconsistent in text style, size and colour. She did not read over her work before submission.

5.1.6 Emma

Emma comes from a non-professional family background. She lives at home with her mother who works as a community care worker. Emma learnt to use the computer from her mother and by 'mucking around'. When Emma requires ICT support, she asks her mother, explaining that if her mother is unable to resolve the issue they 'just leave it'. Emma rates herself 5 out of 10 when asked to make a judgement about her ICT ability. She believes this score will improve with age, due to an increased level of ICT use.

Emma scored 70% on her ICT literacy task, above the class average score of 60%. While collecting information for her list of flag facts, Emma accessed and used both teacher-provided sources. Emma began copying and pasting information from the first

source, although after several minutes she deleted this information. Returning to the first source, Emma highlighted chunks of information and spent some time reading. After this, she typed information from the source into her document, paraphrasing while writing. When conducting her own search, Emma spent a significantly longer period searching than did her peers. During this period, she modified her search terms four times: ‘about flags’, ‘about the worlds flags’, ‘about the Australian flag’ and ‘meaning behind the Australian flag’. For each search Emma ran she selected the first link, reviewed the source and returned to the search page, where she continued reviewing the listed sources in this way. Emma followed as many as five links in order of appearance from each search conducted. During this time, Emma returned to the teacher-provided sources twice before selecting her own source. She added one flag fact from this source to her list. When writing her justification she included the URL of the teacher-provided Enchanted Learning website and discussed the relevance of the content before deleting it and adding her selected web source with the same justification. Emma wrote a short report that included synthesised information from the teacher-provided sources and none from her chosen source. Next, she accessed the learning object and began to read the background information before moving on to design her flag. Emma accessed the instruction page before commencing the activity; however, she navigated away without reading the instructions. After completing her flag, Emma imported its image into her document and wrote a description demonstrating a synthesised understanding of colour and symbolism. Upon completion, Emma formatted her document, applying a consistent heading and body text style. She also ran a spell check and periodically saved her work throughout the task. These two final steps were not conducted by any other students.

5.1.7 Summary

The process and outcome data from the school-based ICT literacy task revealed significant variation in students’ skills, knowledge and engagement. Overall, the students were able to employ a variety of strategies when working to access and evaluate information within the teacher-provided sources, as well as locate an additional source from the Internet. The students used the teacher-provided sources most confidently, collating relevant information directly into their flag fact lists using a number of approaches, including the copy and paste function, dragging and dropping,

typing exactly or adapting from the source by paraphrasing in their own words. All students copied information at this stage, apart from Emma, who began copying and then changed her strategy to paraphrase information.

When searching for their own information source, all students used Google, although Darcy used Google first to locate kids.net.au, an Australian not for profit portal linked to teacher reviewed and categorised age appropriate websites. All students directly derived search terms from the task question using a range of keywords, phrases and questions. Five students changed and refined their search terms while attempting to locate an appropriate source. Hamish did this by adding ‘for kids’ to refine his search. Students tended to select links in order of appearance, without moving beyond the first page of results. Judgements about selected information sources tended to be based on the perceived usefulness of the information. The information collected from student selected sources varied. Students who spent time searching, reading and evaluating collected less information than their peers who moved quickly through the small tasks, often copying large portions of text without engaging with the content.

Students’ ability to synthesise collated information from their flag fact list to write a short report was generally low. This *creating and sharing information* task was most challenging for students. When creating the short report, flag and flag description, students demonstrated a range of skills including copying information into their report, drawing upon existing knowledge, attempting to adapt collected information to reflect their own understanding and reconstructing information to synthesise collated ideas. Students who demonstrated *working with information* skills by collecting and collating relevant and reliable information into their flag fact list were better able to demonstrate *creating and sharing information* skills to synthesise information into a short report. Conversely, those students who struggled to collect and collate relevant and reliable information were limited in their ability to demonstrate skills in *creating and sharing information*.

In summary, the digitally recorded ICT literacy task illustrated the nuanced complexity of school-based ICT literacy practices across both family background groups. For example, Adam, the lowest-scoring student, came from a professional family background, and Emma, a high-performing student, came from a non-professional

background. This suggests that understanding students' ICT literacy practices may not be as a simple as a binary conceptualisation simply associated the digital divide with socioeconomic status (OECD, 2010). Further, the practices captured in the screen recordings highlighted a range of strategies, from non-engagement with content to copying and pasting appropriate information without considering responsible use of information and through to high levels of engagement with content. The student reflective interviews detailed in the following section according to task steps allowed for further understanding of these practices.

5.2 Phase 2 – Student reflections on their school-based ICT literacy task

5.2.1 Part A: Working with information

While working through Part A of the ICT literacy task (refer to Table 32) students engaged with *accessing information* and *evaluating* processes of ICT literacy. Given the opportunity to discuss their practices, students revealed varying levels of confidence, understanding of judgements about the quality of information and comprehension of web sources that were not captured in the outcomes of the ICT task.

5.2.1.1 Flag facts

The first sub-task required students to access two teacher-provided web sources with the purpose of compiling a list of facts about flags. While completing this task, students were working within the *accessing information* and *evaluating* processes of ICT literacy to identify and retrieve information from each source while making judgements about its relevance and usefulness based on their needs.

While students demonstrated a range of skills and strategies for *working with information*, they collectively justified their chosen approach and strategies in relation to time and efficiency. Both Aaron and Adam followed both teacher-provided links, although they only used information from the multimodal website, Enchanted Learning, which was designed for children. Aaron and Adam described this as the easier source from which to access information: "I just felt that, one, it looked better and thought

straightaway it would be useful because it straightaway gives you information" (Aaron); "This page was easy to read, probably" (Adam). Differently, Emma, Hamish, Carly and Darcy accessed and used both teacher-provided sources. Carly compared the different information available from each source: "Well, the other website [Enchanted Learning] was just saying what the colours represented in the flag and this website [Flags 101] was more where flags came from" (Carly). This statement indicates that Carly had a clear purpose in her searching and comprehension of text within the teacher-provided sources. In contrast, observation of Darcy's task indicated a lack of engagement with the text, as she opened the websites and immediately copied and pasted portions of text without reading. When explaining this Darcy, indicated that she had read the paragraph; however, the time between opening, copying and pasting suggests otherwise.

When compiling the fact lists, five of the six students copied information into their list. However, the way in which they copied this information varied. Darcy used the copy and paste function because she thought, "It'd be better and quicker to do that instead of writing [typing] what they've said." Aaron and Carly typed information verbatim from the source, although Aaron started to use the copy and paste function as the task progressed. When asked about this, he explained:

> Aaron: I usually do it. Uh, I think it's because I'm used to it, with the typing it up.
>
> Researcher: If we have a look here, you stopped typing and started copying and pasting. Can you tell me why?
>
> Aaron: Uh, it was quicker and I was probably worrying about not finishing it.

Similarly, Carly and Hamish discussed an awareness of time. However, Carly typed the text verbatim, rather than copying and pasting, believing it would be quicker.

> I thought it would be easier to just type it instead of copying and paste because it take heaps long trying to highlight and then click and then hit copy and then go back onto the thing and then click on it again and say paste. (Carly)

Hamish dragged and dropped text from each website into his document, explaining: "I think it was more of the thing that it was a lot quicker, too, like it's more time-efficient just to copy and paste" (Hamish). By contrast, Emma began copying and pasting, then deleted information and typed facts. She explained:

> I thought it would be easier if I put it in my own words because I change the things a bit. Sometimes when I copy and paste it's what I want to say, sometimes when I read it and I don't really understand it, I write it in my own words so it's easier. (Emma)

Emma described learning this strategy through experimentation and from her mother and the school librarian.

While using the second teacher-provided source, Flags 101, Carly began to type chunks of text from varying locations on the webpage into her fact list. She explained that she only wanted to use interesting information from the website, suggesting that although she was copying information, she had taken the time to read and evaluate the source for usefulness. Carly described learning this strategy from her mother:

> When I was younger at home, I used to love going on the computer and writing stories and all that. Mum told me that if I'm going to use stories off the Internet don't use all of it because then you're just rewriting what someone else wrote. So, I just got some ideas from some of the stories that I read online and wrote some of my stories and added some of their bits into my story. (Carly)

Overall, when *accessing* and *evaluating* the two teacher-provided information sources, students described their decisions in relation to an awareness of time. Most students copied information from the teacher-provided sources. They described learning these information-seeking skills from parents and experimentation, and one student referred to the school librarian.

5.2.1.2 Selecting a source and locating appropriate information

After using the provided sources, students were then required to locate an appropriate website to be used as an additional information source. While completing this task, students were working within the *accessing information* and *evaluating* processes of ICT literacy.

The searching behaviour of students was diverse. Students drew on a range of strategies when *evaluating* sources linked to knowledge from both home and school, including copying, avoiding sites considered inappropriate, selection by domain name and

filtering for age appropriateness. Following redirection from the class teacher, Aaron selected the first unadvertised link from his third search. He explained that he had no evaluation strategy and that selecting the link in this order was what his sister would do: "I don't know why, I've just seen her [his sister] do it before, I copy it all" (Aaron). Aaron also explained that he had not selected any advertised links and again referred to his sister's practice. Similarly, Adam selected his source without *evaluating*; instead, his search strategy was first informed by a judgement to avoid one source that led to the unthought-of selection of the next link in the search results. He explained his selection of the link below Wikipedia on his returned Google search in terms of his understanding of Wikipedia as an unreliable:

> Because the ones before were, like, Wikipedia, which people can just put, like, go on randomly, like, random information…like, when you're searching it, it comes up with an option that you can edit. (Adam)

In contrast, Carly selected and used the second unadvertised link, making her selection based on the *.gov* domain. She described this judgement, indicating that as the site was a government source she considered it therefore reliable: "I would choose a government over a normal one because the government is powerful and is usually, sometimes, it's always right because they get people to study on the subject before they write it" (Carly).

Emma had the most difficulty locating an appropriate source, conducting a number of variations and spending the most amount of time searching. Emma's searching was focused around locating a source that she could comprehend, suggesting that she was engaging with the content with a clear focus and intent. She discussed her attempts to find an appropriate website:

> Emma: I didn't really understand the words and it just looked hard to understand and that, so....
>
> Researcher: And what makes it hard to understand?
>
> Emma: Well, there was all these different words and I think it was just lots of information about what I don't really need.

While she attempted to access and evaluate age appropriate information, Emma's searching was limited by her inability to filter the results to suit her information need. In contrast, both Darcy and Hamish refined their search strategies to reflect themselves as

the intended audience. Darcy used Google to locate kids.net.au, which is designed to filter for child targeted sources, then used this search engine to locate information for her fact list. She discussed learning to use this search engine from the school librarian; she has it bookmarked in the web browser in her school account. When asked why the teacher may have taught the class to use this strategy, Darcy said, “Well it’s like better information and that for school kids to use” (Darcy). Hamish added ‘for kids’ to his search terms in Google, discussing this choice in terms of reliability: “Like we’ve used it before and the teachers usually goes to use it so that, so usually I know it’s a good site” (Hamish).

Overall, when selecting a source and locating appropriate information, students applied practices they had observed at home and learnt in school. One student was particularly focused on collecting useful, age appropriate information, expressing a desire to be able to understand and rephrase this information.

5.2.2 Part B: Creating and sharing information

While working through Part B of the ICT literacy task (Table 32), students engaged with *accessing information*, *developing new understandings* and *communicating with others*. Students described Part B as the ‘hardest’ part of the ICT literacy task. Their performance reflected this judgement, with students demonstrating less confidence in their work.

5.2.2.1 Write a short report

The sub-tasks 6-11 required students to synthesise information to write a short report, design a flag and describe and justify their flag design. Students demonstrated most difficulty in synthesising ideas to *develop new understandings*. Aaron identified writing the report as the hardest task: “…because I had to make my own words up, you know, like, learn from before and then make your own words up” (Aaron). Both Carly and Adam shared this sentiment, with neither student completing a report. Adam wrote one sentence without incorporating any of his collated facts. He described this as a result of struggling to “learn” from the information, while Carly discussed being limited by the amount and variety of information she collected in her search:

> Writing the summary [was the hardest part], to get all that information and to put it into parts where it suited, because you start off with your first paragraph and you've got information in there and when you go to your next paragraph you usually want to put the information you put into your first paragraph into the second paragraph and then when you read it, it sounds like you've just gone over what you've already had in the first paragraph. (Carly)

Carly's early reflections drew attention to the focus of her searching strategy and engagement with the task content. However, her inability to evaluate and collect the 'right' information, hindered her ability to create a sound synthesis. Additionally, Carly stopped writing her report mid-sentence, moving on to the next sub-task, suggesting an awareness of time as influencing her performance. By contrast, Darcy completed her report; however, she did not demonstrate any synthesis. Her report, copied directly from web sources, indicated a lack of engagement with the information within the task. While Darcy engaged with the experience, her engagement with the content was not evident.

Emma and Aaron were able to adapt information to provide a short, linear report demonstrating some synthesis of ideas. Emma discussed her paraphrasing strategy in relation to her own understanding.

> Well, some of the words I don't understand, and it's easier if I ask my mum and she tells me what the meaning is. And then if I can't really say the word I write it in my own words. (Emma)

Hamish adapted his collated flag fact information and then deleted the remaining copied information. He discussed a broader understanding of *using ICT responsibly*, in relation to his information seeking and paraphrasing strategy:

> Uh, I think it's more because sometimes you're not allowed to copy and paste a speech, like in – when I was gathering the notes here I copied and pasted those because that wasn't really part of the report that I was doing at the bottom. I typed, like, further on I copied, like, my notes, I dragged them down and then I put them into my own words. Like it said that, like, flags were used for signalling and all that. (Hamish)

Hamish went on to explain that his mother taught him this strategy: "My mum's told me about stuff, like at high school you're not allowed to copy and paste and she told me like she changed it, like once you copy and pasted it she changed it" (Hamish).

5.2.2.2 Flag design and description

To complete this task, students used an embedded learning object to design their own flag. To complete the learning object, students were first presented with historical information about flags in Australia. Students could choose to engage with this information or begin the activity. The activity allowed students to design their own Australian flag. Once students had completed their flag design, the ICT literacy task required they take a screen shot of their design and insert the flag as in image in their report document. Following this, students were required to write a short description of their Australian flag.

While completing the learning object activity, students were working through the *accessing information* and *developing new understandings* processes of ICT literacy. Students discussed the role of personal preferences in approaching a new task by either accessing instructions before starting something new or beginning immediately and experimenting with the functionality of the learning object. Adam and Carly discussed reading the instructions within the object. Adam explained that reading the instructions is a important aspect of his ICT practice, across contexts, without which he wouldn't know what to do: "because otherwise you wouldn't really know how to play the game" (Adam). Carly was unsure of how to create the flag: "Because I didn't know, like what you had to do to create it [the flag]" (Carly). The others skipped the instructions to experiment with the activity to complete the task. Aaron explained: "Because I didn't think it was that hard, you know, I felt confident about doing it. It just looked easy, you know?" (Aaron).

While composing a description of their flags, students were once again working through the *developing new understandings* and *communicating with others* processes of ICT literacy. Emma, Aaron and Hamish continued on to write a short description of their flag design in terms of its symbolic composition, again, demonstrating the ability to adapt and re-author information. Carly, Adam and Darcy did not adapt information or provide any synthesis of ideas. Instead, Darcy and Carly provided a literal description of the colours and elements in their flag. Adam did not attempt to write any description of his flag design due to lack of time.

5.2.2.3 Preparing document for submission

The last task required students to prepare their document for submission, drawing from the *managing information* and *communicating with others* processes of ICT literacy. Adam and Darcy began the task by selecting text style, size and colour. Adam explained that this was something he learnt in school: " [The school librarian] used to do it in the class, like in Year 5 and Year 4" (Adam). Darcy believed she learnt about formatting on her own:

> Oh, well, no one, I just do it first because it's, I like – if I copy and paste my information first then I just, like, change the colour and make the fonts, and if they take too long to choose I just decide to do that first before, then, before I write something. (Darcy)

In contrast, Emma formatted her document upon completion of the ICT task. Emma's formatting was consistent throughout and more suited to a report than that of her peers. Emma described learning about formatting from her mother:

> Well, first of all, when I had my first project that I had to write out, my mum showed me how to change the fonts. How to change the fonts on our computer. And she said, too, maybe, like, give your headings a bit of a different style so that they stand out. And so I changed and did that, and then, now I keep doing it. (Emma)

5.2.2.4 Student self-efficacy

Students reflected on their ICT literacy to give themselves a score out of 10 to describe their ICT skill and knowledge. Students rated themselves as average users, acknowledging when justifying their score that they were not experts. When provided with the statement that some adults consider all kids to be experts with technology, the students provided some insightful responses. Adam, who achieved the lowest score for the ICT literacy task, agreed, contrasting the low skill of his parents with his own.

> Uh, maybe because I reckon I'm a bit better at using, like, my computer than my dad and my mum a bit now, because they're, like, they don't – they go on for work and all that but they're not really good at, like, going on websites and downloading stuff. (Adam)

Although, Adam came from a professional family background, his parents did not have the skills, knowledge or confidence that afforded him effective access to technology. In this way, Adam considered his ICT literacy greater than that of his parents, resulting in limited support to guide his ICT practices at home. Adam's lack of effective access was further structured by the strict rule set enforced within his home surrounding both his and his brothers' computer use. Adam openly expressed his frustration with this situation, indicating a positive disposition towards ICT and a strong desire to increase his level of engagement and skills.

Both Emma and Hamish also generally discussed children's skill in relation to their parents, indicating a more sophisticated understanding of 'effective access' and the role of technological contacts in shaping ICT practices. For example, Emma explained, "It just depends on how you learn to use it [ICT], if you teach yourself or if your parents or whoever teaches you" (Emma). Similarly, Hamish clarified:

> No, no, not every kid is great at technology, they, like, it's usually, like, the odd couple that are.… Maybe it's the environment they grow up in, like mum and dad are usually on the laptop so maybe they've got one so they spend some time on that at home. (Hamish)

Other students disagreed with the premise, reflecting a more measured view, without being able to clearly articulate why: "Disagree, like, some people may be good at computers, some may not" (Darcy).

Carly made a differentiation between types of ICT, tasks and her level of knowledge. She discussed the difference between low-level intuitive tasks and the more complex processes required when using a computer and the Internet:

> Carly: Well, not all kids are experts with technology, yeah, they are good at, like, iPods and iPads and all that, but some find it really difficult to use a computer.
>
> Researcher: Why do you think there is a difference?
>
> Carly: There is a difference because with an iPod you just open it with your fingers and it's a little, small gadget. But with a computer it's this big thing and you've got to turn on the hard drive, turn on the computer, yeah, wait for it to load, then you've got to click on it and open your, your account and then you've

got to click on – if you want to go on the Internet you've got to click on the Internet. There's more to know.

Students' discussion of their ICT practice indicated that they did not consider themselves ICT-savvy. Instead, they expressed a sense of the social nature of ICT literacy skills, indicating the ways in which children's ICT practices are bound by their experiences. Overall, these findings illustrate that students' ICT literacy is more complex than an assigned set of skills and scores. Each student approached the ICT literacy task with varied preferences, skills and strategies, shaped by both their home and school practices and the practice of their technological contacts. Additionally, the students' reflections highlighted the significant role of the ICT literacy task itself in structuring practice. The implications of these findings are discussed below.

6 Discussion

This study explored the ICT literacy of six students captured in a digitally recorded school-based assessment task and discussed during semi-structured student reflective interviews. This rich data highlighted the variation and complexity of students' practice not captured within a typical quantitative measure. The ICT literacy task was designed as a school-based assessment integrated into the class' regular program, allowing for the exploration of 'typical' school-based ICT literacy in detail. Student explanations of this observable activity revealed patterns of practice and engagement, along with a sense of the structuring impact of the school-based nature of the task. All students discussed their available capital while explaining their practice during the recorded task. These key findings are discussed below according to the study's guiding questions.

6.1 How do primary students perform in terms of their school-based ICT literacy?

The ICT literacy of the six students was both nuanced and diverse. All students were able to demonstrate functional skills that allowed them to engage at varying levels with the task. Overall, student scores ranged from 48% to 78%; however, the findings of this

study illustrate that the complexity of their practice is not best understood through the allocation of a simple test score.

Students demonstrated basic skills when *accessing information* and *evaluating*. While using teacher-provided sources to create a list of flag facts, students demonstrated a range of behaviours, including copying information without reading, skimming and copying based on keywords, as well as reading and adapting information. All students were able to use a search engine to select their own source; however, their evaluation strategies were limited. Students used a combination of keywords, phrases and questions derived directly from the task. While such natural-language queries, typical of browsing rather than directed searching (Jochmann-Mannak, Huibers, Lentz, & Sanders, 2010), are compatible with Google, the ability of students to use formal search strategies required by formal library databases and online repositories is unclear. Two students did attempt to limit their results to filter for age appropriate sources; however, no other advanced search strategies were observed. In terms of evaluation of search results to select a source, none of the students moved beyond the first page. Again, they took a number of approaches, including random selection based on numerical order, selection to avoid Wikipedia, skimming for keywords and selection based on the site's domain name. While the students were able to perform simple searches using natural language queries, these findings suggest the need for direct instruction in formal searching skills to assist students in engaging at a higher level while *working with information*.

When *evaluating* information, students' source selection seemed mostly unconsidered, with justifications of their selected sources mostly limited to the relevance of information. However, during reflective interviews, students explained that they chose their sources because they had previously used the source with their teacher, identified the government domain as being reliable or were avoiding Wikipedia (which was listed in proximity to their chosen source). Students did not write about these judgements in sub-task 5, which asked them detail why their chosen source was appropriate. Similar research found that younger students often lack the skills to critically evaluate search results and web content (Jochmann-Mannak et al., 2010; van Deursen & van Diepen, 2013). This suggests a need for formal instruction and rehearsal focusing on developing

higher order thinking skills and strategies that will allow primary students to engage with web content in a meaningful way.

Overall, students were least confident performing *creating and sharing* sub-tasks that required them to synthesise and adapt information into a short report and flag description. This task was most challenging for students who lacked *working with information* skills to identify information needed and formulate strategies to find, retrieve and evaluate that information. Further, those students who performed well when *working with information* were better equipped to synthesise and adapt their flag fact list to create their own information product. Similarly, recent research suggests that information and strategic skills are crucial for the development of skills in communication and content creation (van Deursen & van Diepen, 2013). In the same way, students who are limited in their ability to work with information are also limited in their ability to create and share information. In understanding this finding reflexivity around the nature of the ICT task is required, specifically in relation to the limited opportunities afforded to students to demonstrate *creating and sharing* processes of ICT literacy without first performing *working with information* processes. However, it is important to note that any performance of critical and creative tasks (*creating and sharing*) first requires an individual to engage with basic skills and knowledge to access and manage information (*working with information*). Thus, any measure designed to capture higher order *creating and sharing* processes will require engagement with *working with information* processes. This is typical of ICT literacy assessments and reflective of the progression in the modules used in the National Assessment of ICT literacy in Australian schools (ACARA, 2015)

Analysis of students' digitally captured ICT task video data revealed varying levels of engagement that may otherwise have gone unnoticed with the scoring of the information product. For example, students' engagement with content varied when collecting information from provided and self-selected sources, with some students investing time reading, evaluating and searching, and others engaging solely with the processes rather than the content by copying information with limited or no reading or evaluation. However, not all students who engaged with the content were able to create a sound information product, although their overall engagement with the task was much higher than that of their peers who simply copied information. This finding illustrates

that while skills in *working with information* are essential for synthesis of information, they do not translate directly into the skills required to create a new information product from that synthesis.

While many students search or browse the Internet outside school, the skills that children need are not confined to information retrieval. As with print, they also need to be able to evaluate and use information critically if they are to transform it into knowledge (Buckingham, 2008, p. 267). Therefore, without support and instruction to develop these skills and strategies for formal searching at school, many young people will be limited in their capacity to create and share information. Furthermore, those students who come from homes in which these more formal skills required to evaluate, comprehend and synthesise information are practiced and discussed are likely to have an advantage over their peers who do not. Formal instruction in the primary school setting to develop a full complement of basic ICT literacy skills may help to address these differences in opportunity.

6.2 What factors influence students' ICT literacy practices?

The interviews uncovered a number of individual and social factors impacting on students' ICT literacy practices, including their skills, knowledge and dispositions, their available support and resources, and the context of the ICT literacy task itself. These social factors are discussed below using Bourdieu's concepts of habitus, capital and field.

6.2.1 Habitus: student preferences

Habitus operates below the level of calculation and consciousness, underlying the conditioning and orienting practices by providing individuals with a sense of how to act and respond (Bourdieu, 1990). Although habitus cannot be directly observed in empirical research, it can be 'apprehended interpretively' (Reay, 2004, p. 439) through a qualitative focus on preferences and practices (Bourdieu, 1984). This study applied similar ideas to focus on students' self reported preferences and digitally captured ICT practice to capture a glimpse of habitus and the ways in which it structures ICT literacy both individually and collectively.

Students' ICT practices were shaped by their skills, knowledge and disposition. While completing the ICT task, they used a variety of information collection strategies. Some students worked methodically through each step, returning to instructions, demonstrating reading and evaluation, accessing instructions, synthesising information and taking the time to read over and edit their work before completion. Others were more ad hoc in their approach, moving back and forth through the task in a seemingly random fashion, while sharing post-task reflections about being lost until hearing the teacher's directional statements. Students later described these particular processes they used as 'usual', suggesting they had a preference or disposition to operate in this way. Such preferences and dispositions are components of an individual's habitus. Habitus is structured by one's past and present circumstances, such as family upbringing and educational experiences. Yet, it is also generative in that one's habitus helps to shape one's present and future practices (Maton, 2008). The diversity with which case students approached this task suggests that students' habitus plays an important role in structuring their ICT literacy practices. This view contrasts with the popular assumption that all young people possess similar preferences and dispositions towards ICT by virtue of their prior experiences with digital technologies, as is assumed by the 'digital native' concept (Prensky, 2001a).

Furthermore, students themselves rejected the notion of all children as possessing uniform ICT preferences and skills, discussing high levels of motivation to engage with ICT and increase their skills as well as indifference and detachment from this type of ICT practice. Students' reflections on their ICT literacy were particularly interesting, and indicated the socially entrenched nature of technologies (Selwyn, 2014). Students made links between their ICT skills and ability and that of their parents and contacts, acknowledging their varied stocks of technological capital, when explaining their ICT literacy. Students also made a distinction between types of technology, levels of complexity and their associated practices, contrasting the knowledge and skills required to access small, intuitive tablet and MP3 player technologies compared with complex practices required to engage with computers and the Internet. While it is often assumed that younger people are skilled in using the Internet, this is only considered true for so-called button knowledge (van Deursen, van Dijk, & Peters, 2011). This reinforces the idea that although students may appear to be 'technologically savvy', this does not mean that they consider themselves to be, share a ubiquitous technology-oriented

habitus or necessarily have developed the skills and competencies that make them responsible, critical and creative users of technology (Eynon & Geniets, 2015; Gronn et al., 2014; OECD, 2010).

6.2.2 Technological capital: available support and resources

The case students' reflections of their ICT literacy practices were inextricably linked with those of their parents and teachers. These technological contacts were referred to as sources of learning through a variety of interactions, including explicit instruction and support, as well as objectified practices, composed of the range of practices and associated values objectified within family homes and classrooms. In this way students' parents and teachers can be considered as cultural and social technological capital. Technological capital, as an extension of capital (Bourdieu, 1997; Bourdieu & Passeron, 1977), forms a pragmatic lens through which differences in the resources that young people draw on when engaging with technology can be uncovered (Selwyn, 2004).

The students in this study also drew on institutionalised cultural capital in the form of school learning. They referred to the role of their teacher(s) and librarian as shaping their approach to paraphrasing information, refining web searches, using a child-focused portal, bookmarking websites and formatting text documents. Students' discussion of their skills learnt at different stages of primary school demonstrated the significant role this institutionalised cultural capital had played in structuring their practice. For these students, this capital seemed to be an important foundation in the acquisition of ICT skills.

Students' families played a fundamental role in shaping their school-based ICT literacy practices. While reflecting on their ICT literacy task, students from professional family backgrounds, apart from Adam, referred to learning school-based ICT literacy practices from their parents and siblings, and described their interactions with parents in relation to paraphrasing information, the expectations of information-seeking in a high school setting and watching or copying the practices of parents and siblings. These interactions are considered objectified cultural capital; they involve socialisation into technology use and culture and social capital in terms of available support within students' home fields (Selwyn, 2004). The greater the stock of cultural and social capital within the family

home and the more closely aligned with school-valued capitals, the greater effective access a young person has to ICT. For Adam, who did not discuss his parents as a source of learning, the absence of school valued technological social and cultural capital compared with the situation of his peers from professional backgrounds, structured the ICT culture within Adam's home and influenced his effective access, potentially structuring his low performance. In contrast, Carly, a lower-scoring student from a professional family background, clearly articulated her large accumulation of technological cultural and social capital at home. However, she also discussed her inclination to not engage with ICT when rating her ICT skill. While this student's accumulation of technological capital may afford her effective access, it seems her lack of interest or disposition (habitus) toward using these resources structured her practice and lower score.

Some variation between the access of the two students from non-professional families to technological capital at home also emerged from task reflections; this variation structured their practice accordingly. Darcy, who received an average score on the ICT task, did not refer to her family members as a source of learning when explaining her digitally captured ICT literacy, indicating a lower stock of technological social and cultural capital at home. Yet, Darcy did refer to school practices and teacher support, suggesting that school played an important role in her acquisition of technological capital associated with formal ICT practices and processes. In contrast, Emma, who scored highly, made consistent references to her experiences working with her mother, who helped her to understand and paraphrase Internet text as well as preparing documents to submit for schoolwork. Such reflections revealed Emma's larger stock of technological capital related to the formal processes of ICT literacy, allowing for a smoother negotiation of knowledge across home and school contexts compared to Darcy.

Regardless of family background, the students with the strongest ICT literacy scores all referred to technological social and cultural capital at home when discussing their practice. This finding adds important new detail to understanding digital inequalities, which have been shown in large-scale assessments of ICT literacy (ACARA, 2012b; OECD, 2010). While social disadvantage is generally associated with lower ICT literacy the various forms of capital to which a young person has access can contribute

to a different outcome. This study shows how access to school valued technological capital can work to structure better than expected outcomes for students from less privileged families, leading to transformative practices. By the same token limited access to school valued technological capital through restriction and lower-skilled contacts even in privileged families may lead to lower than-expected outcomes.

While previous research, exploring adolescents' ICT experiences, notes the significant influence of peers upon ICT practice, the participants in this study did not refer to their peers when discussing their school-based ICT literacy (Eynon & Geniets, 2015; Eynon & Malmberg, 2012). This difference in access to capital, may be explained by the difference in age of participants, given that primary students operate in limited fields and the influence of parents and immediate family is often most significant at this stage in their lives. Additionally, it may be that the focus on formal ICT literacy contributed to the lack of discussion of peers compared to if they had been reporting on social/leisure-based technology activities.

6.2.3 Field: context of the ICT literacy task

To understand young people's use of technology it is important to acknowledge the significance of context and circumstance (Selwyn, 2009, p. 10). In this sense, the field structures the practice, and there are limits to what is possible. The particular circumstance in this case is the ICT literacy task, which was designed to capture students' ICT literacy practices during a two-hour computer session. The assessment task was conducted in the school context and integrated into the class' unit of work. Accordingly, the context of the task must be understood as set by the teacher and bound by both explicit and implicit expectations of the school environment including time, originality, conventions of a formal written text, performing the task in isolation and limitations imposed by the criteria.

While *accessing information*, case students demonstrated a range of basic knowledge in terms of copying and pasting information using the mouse and keyboard commands, dragging and dropping text directly from a source and typing text verbatim. When explaining why they chose these strategies, case students identified time as the key factor structuring their practice. The nature of an assessment task is time-based, and all

students expressed an awareness of this throughout their reflection. Such reflections highlighted two potential areas that structured such practice: a sense of urgency to get through the task by choosing the quickest option and students' awareness of the expectations of a formal school assessment task, with value given to simply completing the task.

The teacher imposed and formal nature of the ICT task were both objective conditions of the school and classroom. The field structured the practice, and there were limits to what was possible. As other academics have explained, the nature and extent of ICT literacy depends on the purposes for which students engage with and use ICT (Buckingham, 2008; Thrupp, 2008). In this sense, the ICT task, intended to capture the formal processes of ICT literacy valued by the school field, excluded other ICT practices by design, and thus captured only one measure of school valued ICT literacy at a single point in time. As this study was focused on providing a more nuanced understanding of primary students' ICT literacy performance captured in large scale assessments, which focus on the same measure of school valued ICT literacy at a single point in time, it was important the task was representative of such a measure.

6.2.4 Factors influencing ICT literacy

This application of Bourdieu's theory of practice casts light on a number of factors influencing the ICT literacy of the students in this study: their own preferences, formal computer skills programs, practices and skills of parents and siblings and the formal, imposed, time-based nature of the ICT task itself. Analysis of student reflection data only employed segments of Bourdieu's theoretical constructs; more background data is required to appreciate the interplay of habitus, capital and field on practice. Understanding students' ICT literacy task performance in this way highlights the inextricable link between ICT practices and the social world. This discussion of case students' ICT literacy practices and reflections aimed to move beyond the one-dimensional nature of a school-based ICT literacy score.

Students' task performance and reflections upon performance suggest that ICT literacy processes increase in complexity. This finding has been reflected in other models and measures of digital literacy that suggests information and strategic skills are crucial for

the development of skills in communication and content creation (Claro et al., 2013; Jun et al., 2012; Kim & Lee, 2013; van Deursen & van Diepen, 2013). In addition, the findings from this study provide new insight from students' perspectives to reveal that students consider *creating and sharing* processes of ICT literacy (evaluate, develop new understandings and communicate with others) as cognitively more demanding.

Overall task performance of the six participating Year 6 students was not illustrative of the patterns of ICT literacy commonly associated with socioeconomic status (ACARA, 2012b; OECD, 2010). Variations in performance and student reflections across family backgrounds highlighted complexities of practice. In this way, ICT literacy is more complex than a set of skills or processes. ICT literacy, embedded in a social context, is a social practice bound by context (field), dispositions (habitus) and available support and resources (capital). Students' explanations of their own ICT literacy illuminated the central role of both parents and teachers in structuring practice. Perhaps most importantly, students with higher levels of ICT literacy discussed interactions with capable family members related to higher order processes of ICT literacy valued in the school field, highlighting the significant structuring role of technological contacts in shaping ICT possibilities regardless of family background. This finding provides a more nuance understanding of variations in ICT literacy performance providing important details of factors enabling school based ICT literacy beyond a class based binary. Similarly, a study investigating parents views of technology detailed a disruption of class-based patterns of ICT practice associated with parents' disposition, skill and confidence in supporting their children, both implicitly and explicitly (Hollingworth et al., 2011). Such findings provide important clues for the ways that students school-based ICT literacy may be enabled rather constrained within both home and school fields.

While this study highlights the potential of habitus capital and field in understanding students' ICT practices, what is needed now is more detailed investigation of students backgrounds to realise the full potential of applying such constructs to ICT practice. In addition, the inclusion of a direct line of questioning, allowing students to reflect on the connection between home practices and school-based practices, is an interesting area worthy of further research. The findings also raise questions about how students are learning to evaluate, synthesis and adapt information within the school environment and

the role of traditional literacy skills in this process. It is important to acknowledge the limitations of this study. Firstly, findings from these six students, three girls and three boys; four from professional family backgrounds and two from working class backgrounds, are not intended to make generalisations. Rather in-depth case description cast a light on the complexities of practice while highlighting student voice. Second, given the specific nature of this ICT literacy task as an assessment of proficiency we have only captured one measure of what the students where capable of in terms of ICT literacy, as defined by the Ministerial Council on Education, Employment, Training and Youth Affairs (2007), for one moment in time. However similar measures are used in Australian schools as part of the National Assessment of ICT literacy and rather than being definitive of practice this data was used with data from semi structured reflective interviews to glean a more considered and holistic understanding of students practice that goes beyond the allocation of a test score.

7 Conclusion

This study aimed to better understand students' ICT literacy from a detailed analysis of their processes as well as the artefacts they produced, and from the students' own explanations of their approaches to the task. The findings showed that students' ICT literacy was varied and complex. Students' engagement with the ICT literacy task illuminated the both the hierarchical and sociocultural nature of ICT literacy. These results suggest that students first require basic skills for *accessing* and *managing information* to develop the more-complex skills required to *evaluate*, *develop new understandings* and *communicate with others*. Students in this study described the latter higher order thinking processes as more difficult. Those who performed strongly across the six processes of ICT literacy all referred to the role of their technological contacts in supporting the development of their skills and knowledge, highlighting the fundamental role of parents, siblings and teachers in structuring practice. While these findings are limited to the ICT literacy of six students, the richly detailed descriptions provide valuable insights about a range of factors that can enable or constrain ICT literacy. The task performance of these students was not completely consistent with broader patterns of ICT literacy commonly associated with socioeconomic status. Instead, students who performed strongly regardless of background had ICT literate parents and siblings as

technological contacts who were able to discuss skills and strategies required by formal processes of ICT literacy. This finding highlights a limitation of the binary view suggested by the term ‘digital divide’ as simply caused by advantage versus disadvantage.

A detailed understanding of the ways parents confer capital to support their children’s school-based ICT literacy highlights the potential for primary school teachers to better support ICT literacy through targeted capital conferring activities. For example, modelling skills and strategies in situ using think-aloud and discussion to confer capital and engage students in the processes of ICT literacy within authentic classroom activities. In the context of the new Australian curriculum’s focus on general ICT capabilities and proposed digital technologies subjects, understanding of students’ existing practices and skill levels is crucial. Without a clear understanding of what learners bring to school-based ICT practices, there is a risk that ICT-enhanced learning initiatives will further exacerbate digital inequalities, as students with the ‘right’ kinds of capital thrive, and those without may continue to ‘get lost in the game’. The empirical application of the theory of practice in this study provided a framework for understanding students’ ICT experiences and explanations of their own school-based performance. This application revealed the ways in which students’ ICT literacy was embedded in social and cultural contexts, uncovering details of structure and agency that worked to enable or constrain ICT literacy. For schools and teachers such knowledge can provide a starting point for designing learning experiences that consciously aim to transform practice rather than unconsciously preserving entrenched inequalities. Affording a discourse that can permit teachers, and accordingly students, the power ‘to redefine the game and the moves which permit one to win in it’ (Bourdieu, 1988, p. 172).

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CHAPTER SEVEN

"Maybe it's the environment we grow up in": Understanding primary students' ICT practices through a Bourdieuian lens

Chapter Seven, written as a traditional results chapter, presents a detailed account of the six selected participants, drawing from all data sources including the background questionnaire, ICT task, student interviews and blog tasks. Data sources were converged to create technology profiles followed by the compilation of detailed student narratives, which allowed comparison between students and application of theoretical framework (details of analysis are provided in the thesis Methodology - Chapter 3, section 7.5). The chapter draws out the key concepts of habitus, capital and field to uncover the differences in each student's ICT literacy, practices and possibilities. This chapter was prepared as a traditional thesis chapter to allow the space to build rich theoretical cases not afforded by shorter journal articles. To do this the descriptive data is first presented as student narratives, followed by an application of the theoretical concepts to narratives, and finally a discussion building on the theoretical analysis to consider both the structured and generative nature of participants' ICT practices. Presenting the data in this way provides data transparency, which affords credibility to the qualitative analysis allowing the reader "to appreciate the richness and nuance of what sources actually say, assess precisely how they relate to broader claims, and evaluate whether they have been interpreted or analysed correctly" (Moravcsik, 2014). As part of this thesis, this chapter explores the ICT experiences of the six embedded participants, and helps to answer Research Question 2, "How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?" It is intended that this chapter will be adapted in the future for an edited book.

1 Introduction

This results chapter presents detailed accounts of six primary students' experiences with ICT to better understand their ICT literacy, practices and possibilities from their perspectives. The data is drawn from multiple sources of rich evidence, including a qualitative questionnaire focusing on students' home ICT experiences, a digitally recorded ICT literacy task, post-task reflective interviews and home/school blog activities. The chapter first presents ICT experience narratives of six participants selected from the study's broader Year 6 case to characterise a range of ICT literacy performance in the school-based literacy task. Each ICT experience profile presents contextual details of the participants' home ICT experiences, ICT literacy practices at home and school and ICT reflections, detailing the participants' perspectives about the role of ICT in their lives. This is followed by an application of Bourdieu's theory of practice to develop a rich understanding about the factors that shaped participants' ICT literacy practice and possibilities. This analysis highlights the influence of the participants' home environment and accumulation of technological capital, together with their orientation towards ICT use and engagement in shaping current ICT practices and future ICT possibilities. This section is followed by a discussion of such practices in the context of the broader social field to consider the ways in which students' home ICT practices are reproduced, restricted and transformed with reference to their school-based ICT literacy. Furthermore, the ICT practices of these young people and their families suggest ways that school-based ICT literacy is both enabled and constrained across home and school contexts. The chapter concludes with a discussion of the implications of these findings for teachers and policy makers to inform the design and provision of effective ICT-enhanced learning experiences that can better address digital inequalities.

2 ICT experience narratives

2.1 Hamish

"I only play games in the morning because there's not enough time to do work." (semi-structured reflection interview)

2.1.1 Home ICT experience

Four people live in Hamish's home: his mother and father, himself and his younger sister. Hamish's parents both work as chemical engineers. Hamish had access to a number of technologies within his home, including one desktop computer, three laptops, two iPods, one iPad and two mobile phones. The family accessed the Internet throughout the house, as well as in a dedicated study space adjoining their dining room. Hamish's family members used ICT throughout a regular week for work, schoolwork, home administration, cricket club administration, games and entertainment. He described a clear understanding of the purposes for which his family use ICT. Work and school tasks were the most valued in the family home, followed closely by the volunteer work that Hamish's father undertook maintaining the cricket club's website. These tasks took precedence over entertainment and game playing. Hamish's parents reflected on their ICT use for a wide range of tasks. Hamish's mother felt that ICT was an important work resource that saves her time. However, she also expresses concern about the impact of ICT on society: "Young people don't know how to spell or communicate, and spend too much time on mobile phones and people don't respect boundaries" (blog task). Hamish's father considers ICT significant in his working and social life, while he expresses concern in regards to cost and the fast pace of development, "the cost of rapid technology developments for the consumer" (blog task). Both Hamish and his sister viewed technology as 'useful'.

2.1.2 ICT practices

Hamish assigned himself a rating of 6-7 out of 10 when describing his ICT skills and knowledge. He scored 78% on the school-based ICT literacy assessment, the strongest score of the six embedded participants detailed in this chapter. Hamish likes using the computer and Internet because they are "useful for research and great for games" (questionnaire). His favourite ICT-based activity is playing games on the Internet, and

his least favourite was typing a report or researching online. Hamish's average weekly use of technology occurred in a shared dedicated workspace, which adjoined the family's dining and living room. He spent most of his timetabled ICT use playing games online (3.5 hours). The remainder of Hamish's ICT use was for schoolwork (1 hour). Hamish described his regular ICT practice:

> I use the computer every day. In the afternoons I usually do homework and sometimes games if I've finished or if I'm fed up with a question and I don't, I can't get the answers. I always play games in the morning because there is not enough time to do work but in the morning, you can just play a few games (semi-structured reflection interview).

Hamish described learning from both parents to use the computer, although he also considered himself to be largely self-taught. He discussed watching his mother use the computer while contemplating where he had acquired his ICT skills and knowledge: "Sometimes when I'm bored on a Saturday afternoon, not much is happening and Mum's on the computer I might go over with her and have a look, have a peek at her screen" (semi-structured reflection interview). When Hamish encountered a technical problem he would attempt to fix it and then ask his father because "he is good with computers" and "can always fix the problem" (semi-structured reflection interview).

2.1.3 ICT reflections

Hamish felt that using ICT at school was important as it provided students with the opportunity to "get used to the technology [because] nowadays...we usually have computers all around the place, so it's good that children get to learn how to use, like, computer search on the web" (semi-structured reflection interview). In the future, Hamish would like to use ICT for work. He was particularly interested in acquiring a work issued laptop that he could use while travelling for work, like his parents.

Hamish shared his opinion in regards to the 'digital native' assumption:

> Not every kid is great at technology, they, like, it's usually, like, the odd couple that are, like, yeah. But the average kid, yeah, they can do the usual things but, like, can't really do the more complex things, the whole complex things when

> they, when things pop up they say stuff about the computer, they usually get, like, Dad (semi-structured reflection interview).

When asked why some children may be better skilled with ICT than others, Hamish referred to their home environment and available resources:

> Maybe it's the environment they grow up in, like Mum and Dad are usually on the laptop so maybe they've got one so they spend some time on that at home. Or maybe, like, they can't afford one, so it's not, so it's a bit hard to get used to it, the technology (semi-structured reflection interview).

In summary, Hamish comes from a professional family background and all his family members confidently used ICT. His home ICT experience provided him with a diverse range of objectified ICT practices and critical values. While Hamish averaged 4.5 hours of ICT use at home per week, the lowest weekly time investment of the six participants, he was confident in his ICT use and scored well on the ICT literacy task. Hamish described himself as being a self-taught ICT user, while also acknowledging the supportive role of his parents. Hamish had a future view to use ICT in his working life. He dismissed the 'digital native' assumption and considered ICT important at school, so that all students had the opportunity to learn.

2.2 Adam

"I'm not very good at the computer…. I would like to know more about the Internet." (semi-structured reflection interview)

2.2.1 Home ICT experience

Adam lives at home with his parents and younger brother. His mother works as an accountant and his father a sales representative. Adam's family members all use technology throughout a regular week. Adam had access to a number of technologies in his family home, including one desktop computer, one laptop and a number of gaming consoles (one Wii console 1, two Nintendo DSes and one PlayStation 2). Both Adam's parents used the desktop and laptop computer throughout the house for work and some Internet browsing related to renovating, and his mother used an iPod to listen to music. Adam and his brother shared the family laptop and gaming console. They both spent time playing video games and consuming videos on YouTube during a regular week. In

Adam's family the sharing of resources between siblings was often a source of conflict: "We have to share the computer and we fight over it a lot" (semi-structured reflection interview). Adam's younger brother viewed both computers and the Internet as important for homework and researching, while Adam considered these technologies significant because he used them frequently. Both boys reflected positively about their ICT use. Adam's parents viewed technology as essential for work; however, they made less enthusiastic reflections with reference to their knowledge, time and values: "Technology is hard up keep up with" and ICT applications were "big time wasters" (blog task). In Adam's family, work and school related tasks were valued over the children's engagement with video games and browsing the Internet for leisure.

2.2.2 ICT practices

Adam likes using technology for playing video games and watching YouTube videos. His least favourite activity is homework "because it's boring" (questionnaire). On average, Adam spent 15 hours per week using technology at home. This average weekly use of technology occurred in shared family spaces. Adam spent most of his timetabled ICT use playing the PlayStation (11 hours). He spent four hours per week using the family laptop computer in the dining room, of which one hour was allocated to homework and the remaining time (3 hours) was allocated to using the computer to watch YouTube videos and browse the Internet.

Adam assigned himself a rating 6 out of 10 when describing his ICT skills and knowledge; he explains his score in relation to his parents' skill, "because I'm not very good at the computer, like my Mum and Dad at home, like, they haven't really, like, done a lot of stuff on computer apart from work, because they didn't grow up with it" (semi-structured reflection interview). Adam felt that if his parents were more skilled at using the computer he would be too. He performed poorly on the ICT literacy task, with an overall score of 48%. Notably, Adam was the only participant who did not complete the assessment due to the allocated time period elapsing.

When describing how he learnt to use computers and the Internet, Adam acknowledged learning from himself, through experimentation first, and then included his teacher and father. He described his parents' technology use as limited because it was only work

related. He made a distinction between the types of skills his father could help him and with and those learnt at school: “Uh, my dad has teached me a lot, like going on the net and all that but at school there’s a lot, we can, like, learn the shortcuts and all that as well that my dad doesn’t really know” (semi-structured reflection interview).

Adam would seek assistance from his father when using the computer “if something pops up on the computer like an update” (semi-structured reflection interview). However, he reported that his parent’s strategy for fixing the computer was to shut it down and call a computer technician: “We have a guy that helps out with like the computers.... He’s a bit of a friend and we pay him because our computers, they’re like stuffed up, so, and he’s been coming around a lot to fix it” (semi-structured reflection interview).

2.2.3 ICT reflections

Adam discussed his interest in having a Facebook account. However, his parents would not allow him to create one, and his ICT use was both restricted and closely monitored at home. Adam described some frustration with the current level of control surrounding his use at home, when considering the role of ICT in his adult life: “Uh, I [will] get to do more stuff because I’m not at my home with my parents and my parents will tell me to get off because I’m on too much” (semi-structured reflection interview). Adam was unsure what he thought about the ‘digital native’ notion and did not respond.

In summary, Adam comes from a professional family background and all his family members use ICT. His home experience with ICT was closely monitored with restrictive rules and his parents expressed some cynicism about the value of technology outside of work and school. Despite this, Adam averaged 15 hours per week playing games, watching YouTube and completing homework. Adam was not overly confident in his ICT ability: while he assigned himself an average score when reflecting on his ability, he also explained that he is “not very good at the computer” (semi-structured reflection interview). Adam scored poorly on the ICT literacy task, receiving the lowest score of all participants. Adam described himself as being a self-taught ICT user and then acknowledged watching the teacher use ICT at school and learning with his father. He made a distinction between the ICT practices at school and the limited practices of

his father at home. Adam had a future view to exercise more freedom and control in his ICT use.

2.3 Aaron

"I never asked my sister how to print. I just told her, 'Can you print this for me?' and she'd do it." (semi-structured reflection interview)

2.3.1 Home ICT experience

Aaron lives at home with his mother, father, two older sisters and younger brother. Aaron's father works as a pathologist and his mother is studying at TAFE (Technical and Further Education) whilst job-seeking. Aaron had access to a number of technologies in his family home, including one laptop computer, three televisions and a range of gaming consoles (one each of Xbox 360, PlayStation, PlayStation Portable and Nintendo DS). Aaron's family members all used ICT throughout a regular week for a range of tasks including work, study, homework, gaming and Facebook. Everyone in Aaron's family used ICT for work or study apart from his younger brother, who used the computer and gaming consoles solely for playing games. Aaron's parents reflected on their ICT use positively while acknowledging that its use, both within their home and more broadly in society, is not without problems. Aaron and his siblings described technology as helpful, although all shared the general idea that ICT should not be used for playing games or for extensive periods. The children's views reflected their family rules surrounding ICT use, and as a result, tasks related to work or school seemed to be more highly valued in Aaron's home than leisure-based tasks. The family had a dedicated 'computer room' with a shared laptop attached to a larger monitor and keyboard that was used by Aaron and his older sister, younger brother and mother. Aaron's father and oldest sister each had a laptop of their own. Aaron had some understanding about his parents' ICT practices. He described their work and study related searching:

> Uh, researching, because he's [father] a pathologist, he does this weird chemical work and then he just goes on to find stuff. … She's [mother] finding a job and she sometimes goes on to YouTube, this kind of weird science system, it's like a piece of metal and scraping along this jelly thing, I'm not really sure what it was (semi-structured reflection interview).

2.3.2 ICT practices

Aaron likes using ICT for communication with family and friends. His favourite activities are playing games and chatting on the Microsoft Network messenger program (MSN). His least favourite activity is studying, because of the associated web searching. His average weekly use of technology occurred in shared spaces including the computer room and lounge room. Aaron spent most of his timetabled ICT use (10 hours) playing games on gaming consoles (PlayStation 2, PlayStation Portable, Xbox 360). The remainder of Aaron's timetabled ICT use was related to schoolwork in the family's dedicated computer room (4.5 hours). Aaron did not record any time playing games on the family computer during a regular week in his family technology timetable; however, he discussed sharing computer time and playing online games with his younger brother, which might suggest his parents were unaware of this shared practice.

Aaron assigned himself a rating 5 out of 10 when describing his ICT skills and knowledge; he explained this average score as follows: "Sometimes I don't know how to do things, I'm not really sure how to print and my sister has to do it all the time for me, [because] I forget about it" (semi-structured reflection interview). He achieved a strong score of 70% on the school-based ICT literacy task. Aaron described learning to use the computer from his sister and the school librarian. When he required help with technology, he would ask his sister or father. Aaron made a differentiation between the types of tasks he sought help for from his sister or father:

> Usually I'd call my sister, or sometimes I could do it myself, I look around, and see what to do and if I can't do it I tell my sister. [Then] I would ask my Dad because he, he fixes the computer up for, like, big problems, you know, and if I have a virus my Dad would do something (semi-structured reflection interview).

2.3.3 ICT reflections

When presented with the 'digital native' notion, Aaron disagreed: "Some kids don't probably even know how to." He went on to explain this statement in terms of interest and available resources:

> Because they don't ask how to do it, mmm yeah, that's what I think. Well, I never asked my sister how to print, I just told her, "Can you print this for me?", and she'd do it.... You have to learn off your mum and dad, or like I have to learn off my sister (semi-structured reflection interview).

Aaron believed adults possessed greater ICT skills and knowledge than children because "if they go to work they might use a computer all the time" (semi-structured reflection interview).

When reflecting on ICT use at school Aaron explained that he liked the way his teacher used ICT with his class and did not see a need for change. Aaron also described how he had occasionally visited the lab at lunchtime to play computer games when he was younger. In the future Aaron believed he would use ICT for studying.

In summary, Aaron comes from a professional family background and all of his family members confidently use ICT. His home ICT experience provided him with a diverse range of objectified ICT practices and critical values. The family rules surrounding ICT use were embodied in the children of the family, who collectively warned against investing too much time using ICT as well as gaming. Aaron described learning from his older sister and father, although he clearly indicated a preference for having his sister complete ICT tasks that he was unskilled in performing. Aaron had a future view to use ICT for further study. He dismissed the 'digital native' premise on personal grounds, explaining that some children, like himself, may not be interested in learning how to use ICT.

2.4 Carly

"I could improve…if I used it more." (semi-structured reflection interview)

2.4.1 Home ICT experience

Carly lives at home with her mother, father and older brother. Her father works as a business banker and her mother works as plant material supplies officer. Carly's family members all used ICT throughout a regular week for a range of tasks including work, schoolwork, home administration, social networking and entertainment. Carly had access to a number of technologies within the family home, including five televisions,

one DVD player, one portable DVD player, one desktop computer, one laptop computer, her father's work laptop, two iPods, one iPhone and three gaming consoles (Wii, PlayStation and Xbox). All of the family's Internet access occurred in a dedicated study, gaming occurred in the lounge room and Carly and her brother used their iPods to listen to music throughout the house. Carly clearly described the purpose of her parents' ICT use, discussing their Internet searching in detail. Carly's parents described ICT as an important tool for modern life, making information accessible and tasks both quicker and easier, although, her mother expressed concern about reliability, "they are good until they break down" (blog task). Carly and her brother also viewed technology as significant in their lives.

2.4.2 ICT practices

Carly likes using ICT for playing games and talking to friends. Her favourite ICT-based activity is chatting with her friends on Facebook. Her least favourite activity is researching and homework. Carly did not believe that she spent a significant amount of time using ICT. Her average weekly use of technology occurred in shared spaces including the family study and lounge room. She spent most of her timetabled weekly ICT use doing homework (5 hours). The remainder of Carly's ICT use was for Facebook (4 hours) and listening to music on her iPod (1 hour 15 minutes).

Carly assigned herself a rating of 5-6 out of 10 when describing her ICT skills and knowledge, explaining her ability as "not bad, but not an expert" (semi-structured reflection interview). She scored 57% on the school-based ICT literacy task, which was slightly below the class average of 68%. Carly discussed her ICT literacy as being fluid: "I could improve this if I used it more, [I would] learn much more about technology if I used it more" (semi-structured reflection interview). Carly's brother and mother taught her how to use the computer and she asked them both for help if she encountered a problem she couldn't resolve. Carly also included the school librarian as a source of ICT learning.

2.4.3 ICT reflections

Carly disagreed with the 'digital native' notion, giving two explanations: she considered adults to be expert users of technology because "they've (kids) still got to learn much more about technologies, but with adults they've already been a child that learned so much about the technology they use" (semi-structured reflection interview).; and she made a clear distinction between, on the one hand, small, intuitive technologies and, on the other hand, computers and the Internet, which she considered to require a larger knowledge and skill set. She considered this to be a common misconception of adults: "Well, not all kids are experts with technology. Yeah, they are good at, like, iPods and iPads and all, but some find it really difficult to use a computer" (semi-structured reflection interview).

Carly indicated a desire to use computers more frequently at school, although she said that a balance between computer use and physical activity is important:

> I think it's a good idea [to increase ICT use in school] but they [students] shouldn't always be on the computer.... You've got to go outside and do other activities and sport and fitness and then you've got to come back inside and you're back on the computer again (semi-structured reflection interview).

Carly would like to use ICT as an adult to create and share on the Internet: "Well, I would like to make my own website and do graphic designs and draw the pictures on the computer and put them on that website for everyone else to see" (semi-structured reflection interview).

In summary, Carly comes from a professional family background, and all her family members use ICT. Her home ICT experience provided her with a diverse range of objectified ICT practices, and her parents viewed ICT positively. Carly averaged 9 hours and 15 minutes per week engaged with ICT for homework, social networking and listening to music. She was not overly confident in her ICT ability, assigning herself an average rating, and, indeed, she received a low score on the ICT literacy task. Carly learnt to use a computer from her brother and mother and the school librarian. Interestingly, she made a distinction between small, intuitive technologies and computers, explaining that confident use of such small tools did not necessarily transfer

to the broader application of a computer and the Internet. Carly had a future view to use ICT to for graphic design and website creation.

2.5 Emma

"*It just depends on how you learn to use it, if you teach yourself or if your parents or whoever teaches you.*" (semi-structured reflection interview)

2.5.1 Home ICT experience

Emma lives with her mother; she has an older brother who does not live in the family home. Emma's mother works as a community care worker. Emma and her mother both used technology throughout a regular week for social networking and entertainment as well as Emma's homework. Emma's mother reflected on her technology use positively, as it "makes life easier" (blog task) and was important for communication and school. Emma viewed technology as important for entertainment. Emma had access to a number of technologies within the family home, including three televisions, three phones, one laptop computer, one iPod and one PlayStation 2. All of the family's Internet access occurred in the dining room on the laptop. Emma played games on her iPod and PlayStation 2 in her bedroom. Emma discussed a range of shared ICT practices with her mother, and when describing her ICT literacy practices she made frequent reference to these informal learning experiences.

2.5.2 ICT practices

Emma assigned herself a rating of 5 out of 10 when describing her ICT skills and knowledge, although she did believe this score would improve with age, due to her expectation of an increased level of ICT use in high school. She performed strongly on the school-based ICT literacy assessment, achieving a score of 70%, above the class average of 60%. Emma liked using ICT for playing games and chatting on Facebook; these were her favourite ICT-based activities. Her least favourite activity was homework, as 'it is really boring'. She also described computer viruses when discussing aspects of ICT that she disliked: "Well, sometimes, they get viruses and some things they don't work when the buttons work.... My computer got a virus once and I didn't

like that because they're always trying to scam you" (semi-structured reflection interview).

Emma's average weekly use of ICT occurred in both shared and private spaces. Emma spent most of her timetabled ICT use on the family laptop in the dining room, engaging with Facebook (14 hours) and schoolwork (1 hour). The remainder of her technology use was allocated to playing games with her iPod in her bedroom (2 hours). Emma described learning to use the computer by "mucking around" (questionnaire), as well as from her mother: "Sometimes I watch my mum, when I need help she helps me and tells me what I should do so I can learn it" (semi-structured reflection interview). She also described learning 'a bit' at school, referring to the school librarian's skills-focused learning program. When Emma had a problem, she would ask her mother. If there was a problem that her mother could not resolve, Emma explained that they would shut the computer down and start again or 'just leave it'.

2.5.3 ICT reflections

Emma disagreed with the 'digital native' notion and discussed variation in children's technology skills as being a result of available technological contacts. "Not all kids [are experts with technology] because some kids don't know how to use things on the computer they need help with it. I don't think anybody that's a child could be an expert…. It just depends on how you learn to use it, if you teach yourself or if your parents or whoever teaches you" (semi-structured reflection interview).

Emma described computer use at school as 'annoying' due to the number of blocked sites when searching for information. When asked how she would like to use ICT in the classroom, Emma provided a clear, specific response: "I think we [could] use them a bit more, but one thing that I thought would be really cool to do is, like, if we could do a video chat with people overseas or with other schools." Emma also had a clear idea about the role of computers in her future adult life, expressing interest in the creation of computer software. "Well, I'd actually thought I'd like to make some…make the software" (semi-structured reflection interview).

In summary, Emma comes from a non-professional family, living in a home with her mother who confidently uses ICT for entertainment. Her home experience with technology involved shared practices and incidental learning experiences between mother and daughter at the family laptop in the dining room. Her mother viewed ICT as important for communication and Emma's education. Emma averaged 17 hours per week using ICT. She was not overly confident in her ability, rating her ICT skill and knowledge as average, yet she scored strongly on the ICT literacy task. Emma learnt to use the computer through experimentation, from her mother and at school. She had a future view to use technology in her adult working life writing software programs.

2.6 Darcy

"You never know what you can do with technology." (semi-structured reflection interview).

2.6.1 Home ICT experience

Darcy lives with her mother, father and two older sisters, Maggie and Rose. Darcy's sisters both attend the local high school. Darcy's father work as a traffic controller and her mother is a shop assistant. Darcy had access to a number of technologies within her home, including one desktop computer, three laptop computers belonging to Darcy and her sisters, a Nintendo gaming console and four iPods. In addition, every member of Darcy's family had a mobile phone. The family desktop computer was located in the lounge room, and the children could connect to the Internet throughout the house. Darcy and her sisters accessed the Internet on their laptops in their private bedroom spaces. Darcy's family members, apart from her mother, who did not use the computer unless with her husband to browse the Internet, used technology throughout a regular week for schoolwork, entertainment, social networking and some Internet browsing. Darcy's father discussed his technology use in terms of his 'satnav', mobile phone and 'looking up things on the Internet' (blog task). Her older sisters both used their laptops for schoolwork and Facebook. Darcy's parents considered ICT to be a 'necessary evil' and 'making things less personal' (blog task). As a non-user her mother considered ICTs to be insignificant, while her father explained that he could not 'live without them' (blog task). Darcy and her sisters all viewed technology positively. Maggie and Rose considered the Internet an important tool for accessing school-based resources, and

Darcy spoke in generally optimistic terms about her ICT use; for example, "[Technology is a] great way to do things…. You never know what you can do with technology" (semi-structured reflection interview).

2.6.2 ICT practices

Darcy had some trouble making a judgement about her ICT skill and knowledge. She first scored herself a 10 out of 10, and then changed her mind when asked if she considered herself an expert:

> Well, I'm not an expert and I don't, and I know obvious stuff about the computer so I'd probably be in the middle, probably maybe about a six or five. I'm not an expert but I'm pretty good at using the laptop (semi-structured reflection interview).

She scored 65% on her school-based ICT literacy task, slightly above the class average of 60%. Darcy liked using ICT for searching the Internet, checking her email and using Facebook. Her favourite ICT based activity was chatting on Facebook. Her least favourite activity was checking her email because she had trouble remembering her password. Her weekly use of technology (7 hours 10 minutes) occurred in private spaces. She spent most of this time on Facebook (5 hours) and completing homework (30 minutes) in her bedroom. The remainder of Darcy's technology use was allocated to playing games on a Nintendo in the lounge room (1 hour) and listening to music (40 minutes).

Darcy described learning to use the computer from her oldest sister, Maggie, because "she is the best at doing it" (semi-structured reflection interview). In addition to her sister, Darcy also included the school librarian as a source of learning. When she had a problem, Darcy would ask her sisters, first Maggie, then Rose, and then her Dad. "Yeah, if I don't know how to do this thing or it's not, like, working, [I say,] 'Maggie, this isn't working I need help'" (semi-structured reflection interview). Darcy often asked her sisters for help and she discussed important lessons learnt from these interactions, in particular her understanding about avoiding computer viruses:

> Viruses, yeah, like, things like those popup things, Oh you've won $100 000, click me. [This means] you've got a big virus on your computer, which is really bad and they do that just to distract you... but they've [her sisters] told us not to do it, so I don't (semi-structured reflection interview).

If Darcy had a computer problem that her siblings and father could not solve she was unsure what she might do to resolve the issue.

2.6.3 ICT reflections

Darcy disagreed with the notion of 'digital natives': "Some people may be good at computers, and some may not" (semi-structured reflection interview). In terms of ICT use at school, Darcy suggested that she would like to use Facebook so she could chat with her friends at lunchtime. She said that she would use ICT as an adult, as she would like to become a teacher: "I want to be a teacher when I grow up so I might need to use a[n interactive] whiteboard and the photocopy machine" (semi-structured reflection interview).

In summary, Darcy comes from a non-professional family. Her older sisters and father used ICT, but her mother did not. Darcy's home was well resourced and connected, with each child having access to a laptop computer in addition to a family desktop computer. Her home experience with ICT was framed by her older sisters' practices, as they possessed the greatest ICT knowledge and skill within the family. Darcy and her sisters experienced much freedom and privacy in their ICT use. Darcy was confident in her ICT ability, although she received an average score on the school-based ICT literacy task. Darcy learnt to use the computer from her sisters and at school. She had a future view to use ICT in her adult working life as a teacher.

3 Applying a Bourdieuian Lens

A Bourdieuian lens was applied to participants' ICT experiences to better understand the contextual factors that shaped their ICT literacy practices. This analysis draws attention to both the structured (shaped through objective social and cultural factors) and generative (shaped through dispositions and practices) nature of students' ICT practice. A discussion of this analysis follows, according habitus, capital and field at both an individual level and across participants. The distinction between each construct was made at both a methodological and an analytical level, allowing a focus on separate constructs in the design of data collection tools and throughout analysis. However, it is

acknowledged that each construct is dynamic and interrelated, and discussion of one construct often requires consideration of another.

3.1 Habitus

Habitus represents the dispositions that shape individuals to become who they are, and yet also includes the conditions of existence, which are shown in their relations to society in and through individual activities (Bourdieu, 1990). In this study habitus is apprehended through analysis of students and their families preferences, practices and orientation toward the use of experiences with technology. Components of habitus focusing on ICT practices and preferences were apprehended from the six ICT experience narratives. An overview of each of these practices and preferences including participants' family background, orientation towards ICT, investment and ability, is provided in Table 33. A detailed description of each of these underlying structured and generative characteristics follows.

Table 31. Habitus: ICT practices and preferences

Participant	Hamish Professional family background	Adam Professional family background	Aaron Professional family background	Carly Professional family background	Emma Non-professional family background	Darcy Non-professional family background
School-based ICT literacy (%)	78%	48%	70%	57%	70%	65%
Likes	Playing games on the internet	YouTube & games	Games & MSN	Facebook chat	Facebook	Facebook
Dislikes	Typing a report or researching online	Homework	Researching for homework	Researching for homework	Homework	Checking email
Weekly time spent using ICT at home	Playing games (Computer) = 3.5hrs Homework (computer & Internet) = 1hr	Playing games (PlayStation) = 11hrs Browsing (YouTube & games) = 3hrs Homework (computer & Internet) = 1hr	Playing games (PlayStation2, PSP & Xbox) = 10hrs Homework (computer & Internet) = 4.5hrs	Homework (computer & Internet) = 5hrs Social media (Facebook) = 4hrs Listening to music (iPod) = 1hr 15min	Social media (Facebook) = 14hrs Homework (computer & Internet) = 1hr Playing games (iPod) = 2hrs	Social media (Facebook) = 5hrs Playing games (Nintendo) = 1hr Listening to music (iPod) = 40min Homework (computer & Internet) = 30min
Orientation towards ICT	Considered ICT “useful” Spent time “looking around for the answers” Schoolwork took precedence over other tasks Described watching his mother to learn about ICT	Spent time teaching himself how to use the computer Describes himself as “not very good at the computer” and “would to know more about the Internet” Frustrated at not being able “to do more stuff”	Preferred to have his sister “do it for him” instead of investing time to learn Considered ICT helpful, although explained important to avoid extended periods of use and warned against game playing	Considered her weekly time investment low Consider her ICT ability “not bad, but not an expert” Acknowledged that she could improve her ICT skill if she increased her use	Enjoyed spending time “mucking around” to “figure things out” Described watching her mother to learn about ICT Had clear ideas about different ICT practices she would like to engage in at school	Expressed a generally positive orientation and sense of wonder towards ICT Confident in her ability “I’m not an expert but I’m pretty good at using the laptop” Children expert ICT users in Darcy’s home

The six embedded participants in this study were purposively selected to represent variation in school-based ICT literacy scores and recorded practices. As a result, two of the participants, Emma and Darcy, came from non-professional families and four, Hamish, Adam, Aaron and Carly, from professional families. A comparison of school-based ICT literacy scores as one underlying characteristic of habitus, showed no clear pattern of achievement linked to the positioning of the students and their families in society. Accordingly, participants' school-based ICT literacy scores were not representative of common patterns of digital inequality associated with socioeconomic status. The overall ICT literacy scores of Emma and Darcy, both from non-professional families, was above the class average of 60%, with Darcy scoring 65% and Emma 70%. In contrast, Adam and Carly, both from professional-family backgrounds, scored below the class average, with Adam scoring 48% and Carly 57%. Hamish, from a professional family background, achieved the highest score of 78%. Additionally, highest and lowest scoring students, Hamish (78%) and Adam (48%), came from professional family backgrounds.

On the surface level, participants described similar ICT preferences, all enjoying using technologies for entertainment and communication-based tasks while disliking using technologies for homework or school-based tasks. Participants shared the view that time engaged with technology would lead to greater ICT skill and knowledge, although not all participants demonstrated an orientation towards investing time with technology. Darcy, Adam, Hamish and Emma discussed an investment in their own ICT practice, describing 'fiddling' or 'mucking around' as strategies for learning to use ICT. This type of investment and discovery learning through play and repetition is typically an attribute assigned to the 'digital native' (Prensky, 2001b). However, it was not typical for all participants, as both Aaron and Carly discussed indifference towards this type of investment in engaging and learning with ICT. While both participants expressed an interest in technology use, they described an indifference towards actively engaging with technologies to build their ICT skills and knowledge. Aaron described his preference for having his sister perform technology tasks for him instead of learning for himself. This disposition, in terms of a low motivation to learn, structured Aaron's technology practice, orienting him towards the set of technology practices that he had already mastered. Likewise, Carly acknowledged that if she spent more time engaged with technologies her skill level would improve, yet she didn't discuss engaging in this

type of self-discovery learning. For Carly and Aaron, their habitus, expressed as indifference towards investing time with ICT for the purpose self-discovery learning, structured the types of ICT activities to which they were inclined. In this way, they potentially narrowed their future ICT possibilities compared to those of their peers with a more technology oriented habitus, who enjoyed investing time in self-discovery ICT practice.

For those participants who discussed a preference for self-discovery ICT play and practice, this investment was not always associated with large amounts of time. For example, Hamish indicated an orientation towards investment in self-discovery learning with ICT whilst recording the lowest weekly time using technology (3.5 hours). Additionally, Hamish achieved the highest ICT proficiency (78%) of the six participants and the second highest score within his class. Hamish discussed his limited time for computer use and described allocating his tasks accordingly, reserving brief opportunities for game playing, as they were not conducive to school-work tasks. In this way, Hamish's practice suggests that the quality of his engagement, rather than time spent engaged with ICT, had an impact on his proficiency. In contrast, Hamish's peers spent substantially longer periods engaged with ICT during a regular week, ranging from seven to 17 hours. Emma spent the most amount of time using ICT each week (17 hours), during which she browsed the Internet, used social media, completed homework, played games on her iPod and 'mucked around'. Emma performed well on her school-based ICT literacy task, achieving a total score of 70%, above the class average of 60%. These long time periods could be seen to have a positive effect on Emma's formal ICT proficiency. For Adam, who scored the lowest on the ICT literacy task (48%), time did not have a positive effect on his proficiency. Like Emma, Adam spent a substantial amount of time during a regular week engaged with technology (15 hours). However, during this time Adam spent 11 hours playing games with his brother on a PlayStation, and the remaining four hours using the family laptop to browsing the Internet, 'fiddling around' (3 hours) and completing homework (1 hour). This suggests that time spent simply immersed in technology-based tasks does not necessarily lead to more formal ICT skills and competencies that are valued in a school context, raising questions about quality of tasks and connections to formal ICT literacy, along with the potential differences in students' access to capital and the objective conditions of the home field in shaping ICT practice.

What these findings illustrate is that habitus, plays an important role in generating the type of activities that students are inclined to engage in and learn about, shaping the possibilities available to them. However, an understanding of habitus captures only part of the picture, and in fact raises more questions about how a student's background works to structure habitus and, in turn, practice. What is needed is a deeper examination of the dynamic and interrelated relationship of habitus, capital and field to better understand the differences in practice. For example, students' habitus may be quite different when considered along with their access to capital and the objective conditions of the material and social environment. More specifically, examining access to capital allows the elaboration of aspects of students' habitus to the forms of technology to which they have access (Czerniewicz & Brown, 2013). This further analysis has been applied to the students' ICT experience narratives; the findings are discussed below.

3.2 Capital

Technological capital, an extension of Bourdieu's capital (Bourdieu, 1997; Bourdieu & Passeron, 1977), is useful for highlighting fundamental differences in the economic, cultural and social resources that individuals and communities can draw upon when engaging with technology, and they are able to assume as part of their strategy of reproduction or transformation (Selwyn, 2004). An exploration of participants' economic, cultural and social capital follows.

3.2.1 Economic capital

In this study economic capital refers to "material resourcing of students' home and school environments including quality, quantity of equipment and capacity for maintenance and upgrade of equipment" (Selwyn, 2004, p. 355). All six participants had access to a range of digital technologies, including at least one computer and Internet connection within their home field. The division of computer resources within students' home fields is detailed in Table 34.

Table 32. Economic capital: Material division of computer resources

Material resourcing	Participant	Family background
Own computer	Darcy	Non-professional – labour and related workers
	Carly	Professional
Shared computer -1 other	Adam	Professional
	Emma	Non-professional – intermediate clerical, sales and service workers
	Hamish	Professional
Shared computer – >1 other	Aaron	Professional

For all participants, the available economic capital of their family allowed the provision of adequate ICT material resourcing, regardless of family background. Such findings illustrated that while differences in quantity and allocation of resources were evident between students, they were not associated with parental occupation categories. Darcy and Carly (from professional and non-professional families) had access to their own computer resources. Adam, Aaron, Hamish (professional families) and Emma (non-professional family) shared computer resources. For these participants, who shared computer resources, the type of sharing arrangement was negotiated between family members. Sharing arrangements reflected a number of objective conditions of each home field, including family ICT culture, positions of power and rules. These conditions are explored in a discussion of students' home fields in Section 3.3.

In contrast to the other participants, Adam described his parents' exchange of economic capital into social capital in the form of regular professional ICT support for troubleshooting and computer maintenance within the home. His parents accessed this support as they did not have the skill to resolve family ICT issues. No other participant discussed this type of direct economic capital conversion to access support. While Adam's parents drew upon their economic resources to compensate for their own lack of technological capital, this exchange did not result in the acquisition of social and cultural resources that Adam required for increased effective ICT access. Adam achieved the lowest ICT literacy score (48%) of the six embedded participants. This

finding draws attention the important role of social and cultural capital in structuring students' ICT literacy practices. This type of capital has been commonly associated with a 'digital divide' that separates those with the competences and skills to benefit from ICT use from those who do not (OECD, 2010).

In summary, all participants had access to material ICT resources regardless of family background. There was no clear difference between professional and non-professional families in relation to material resourcing; however, differences in number of computers were evident amongst the six participants. Darcy, from a non-professional family, had the most physical access to ICT of all participants possessing her own laptop computer, while Aaron, from a professional family, had the least physical access, sharing one computer with four other family members. Only one participant discussed the direct exchange of economic capital for ICT support.

3.2.2 Social capital

Social capital refers to students' networks of 'technological contacts' and support. These can include family, friends, neighbours, tutors and other 'significant others'; membership of groups/organisations; or remote online help facilities and commercial help lines (Selwyn, 2004, p. 355). Table 35 details students' available technological contacts, their ICT familiarity and the practices that occur within their home fields. Contacts marked with an asterisk are the family members, or in Adam's case, external support, from whom students seek help when there is a technology issue at home.

Table 33. Social capital: Technological contacts

Student	Contact(s)	Familiarity	Home practices
Hamish	Dad* and Mum*	Confident, regular users	Work, sport, leisure, entertainment, cricket-club website design and maintenance, Skype
Aaron	Dad*	Confident, regular user	Work, reading journals
	Older sisters*	Confident, regular users	Study and social networking
	Mum	Regular user	Study
Adam	Mum and Dad	Apprehensive, low-confidence users	Work, web browsing
	Computer technician*		Troubleshooting and maintenance
Carly	Mum*	Confident, regular user	Work, web browsing, home admin, shopping, work
	Dad	Confident, regular user	Work, web browsing, home admin
	Older brother*	Confident, regular user	Social networking, online manga community
Emma	Mum*	Confident, regular user	Web browsing and social networking (Facebook)
Darcy	Dad	Regular user	Web browsing
	Mum	Non-user	
	Older sisters*	Confident, regular users	Schoolwork and Facebook

All participants acted in limited fields, including both home and school. Thus, the practice and knowledge of technological contacts in these fields would seem crucial in structuring students' ICT practice. Hamish, Aaron, Carly and Emma all had parent(s) who were regular, confident users of technology within their support network.
In contrast, both Adam and Darcy described their parents' low skill and confidence. For Adam, whose parents were apprehensive in approaching tasks outside of work due low levels of confidence, the family's regular computer technician resolved technical problems. Darcy's network of support included her older sisters along with her father, whom she occasionally consulted if her sisters were not available. Her mother did not use the computer or Internet and was unable to provide support. All students, except Hamish, mentioned the school librarian as a source of learning and support at school, referring to the weekly skills-based program that they all attended.

Hamish, Adam, Aaron and Carly, from professional family backgrounds, all had parents who regularly used technology for work. Despite this, Adam's parents described low

confidence in ICT use outside of work related practice. Emma and Darcy, both from non-professional families, had only one parent, neither of whom used technology for work, as a technological contact. However, the skill of these contacts varied, shaping the girls' practice in different ways. Darcy described her sisters as the possessing the greatest ICT skill in her family and only engaged with her father for support if there was no other option, as he was less skilled than her siblings. In contrast, Emma's reflections of her shared practices with her mother were indicative of her mother's confidence with ICT in relation to Emma's school practice.

The skill level, knowledge and types of activities these technological contacts regularly engaged in determined the type and level of support they could make available to the students, shaping participants' current and potential practices through a process of technological socialisation. A clearer understanding of the role of technological contacts in the process of socialisation is explored below in terms of available cultural capital.

3.2.3 Cultural capital

Students' available cultural capital is detailed in Table 36 in two forms: embodied and objectified. In terms of technological capital, embodied cultural capital refers to "self-interest in investing time into self-improvement of ICT skills, active participation in ICT education both formal within school and informal outside of school", and objectified cultural capital refers to "socialization into technology use and 'techno-culture' via techno- cultural goods (e.g. exposure to ICT via magazines, books and other media), family, peers and other agents of socialization" (Selwyn, 2004, p. 355). Importantly, Bourdieu's construct of habitus, defined in section 3.2.1 of this chapter, has been criticised as being an extension of cultural capital. However, Bourdieuian scholars explain that unlike objectified and embodied cultural capitals, habitus, consisting of attitudes and dispositions, doesn't have a material existence in the world (Maton, 2012; Moore, 2012).

Table 34. Embodied and objectified cultural capital

	Embodied	Objectified
	“self-interest in investing time into self-improvement of ICT skills, active participation in ICT education both formal and informal”	“socialization into technology use and ‘techno-culture’ via techno- cultural goods (e.g. exposure to ICT via magazines, books and other media), family, peers and other agents of socialization” (Selwyn, 2004, p. 355).
Hamish	Self taught – spends time ‘looking around for the answers’ Work over play	No computer problem his dad couldn’t fix Highly valued – work/study Critical view of the social impact of technologies Broad set of practices for consuming and creating – work, sport, leisure, entertainment Transparency around practices
Aaron	Discusses having his sister perform technology tasks for him rather than finding out how to ‘do it’ himself Occasionally visits computer lab at lunch	Value on work/study related tasks – resources allocated accordingly Leisure tasks limited Some idea purpose of parents’ use (related to work) Practices for consuming – work and entertainment
Adam	Discusses spending time teaching himself how to use the computer Expresses his strong desire to be allowed greater freedom around his computer use	Valued for work/study related tasks Cynical about the value of other tasks Parents openly express unease with technology related tasks outside of work Clear rules surrounding use/use monitored – no Internet in private spaces, time limits and no Facebook
Carly	Acknowledges that time is significant in skill and knowledge through stating that her own skill level could improve if she invested time	Valued generally Parents regular technology users Parents’ practices for consuming, older brother consumes and creates Transparency around practices
Emma	Emma describes her self-interest in spending time ‘mucking around’ until she ‘figures things out’	Highly valued Emma’s mother’s high-level use of Facebook for communication Narrow set of practices for consuming
Darcy	Spends time with her sister using Facebook to learn	Parents discuss technology as a necessary evil Darcy’s mother cannot use computer technologies Father has low level of use guided by older sister Darcy’s older sisters view technology positively Narrow set of practices for consuming framed by older sister

For Hamish, who had the highest measure of school-based ICT literacy, his habitus oriented him towards technology practice in a pragmatic work-over-play manner. Hamish's objectified cultural capital was composed of socialisation into a 'techno-culture' that valued technology for work and study, while supporting a broad set of practices for consuming and creating. There was a transparency around technology practices, and all ICT related tasks served a clear purpose. Hamish's parents were both confident technology users and fostered a critical view of the impact of technologies upon society. Hamish could not conceive of a problem with the technology in his home that his father would not be able to fix.

For Adam, who had the lowest ICT proficiency, his habitus oriented him positively towards technology practice, although his capital accumulation (economic heavy/socially and culturally poor) structured the possibilities available to him. Like Hamish, Adam enjoyed using technology and preferred game playing. However, the objectified cultural capital available to Adam was different and structured his practice as a struggle over time, activities and knowledge. Adam had been socialised into a techno-culture that valued technology for work and study, although it supported a narrow set of practices. His parents expressed unease with technology related tasks outside of work, and Adam considered them ill-equipped to support Adam's ICT practice. Adam's parents had established clear boundaries limiting ICT practice with the laptop and Internet, perhaps because of their discomfort with ICT. These boundaries and rules limited Adam's opportunities to invest time in discovery learning online through play and repetition.

Aaron and Carly, from professional families, generally enjoyed engaging with ICT; however, they both expressed less of an inclination to invest time engaging in experimental learning with ICT than did their peers. An analysis of both students' access to objectified cultural capital uncovered variation in the structures that worked to shape their habitus and practice. The objectified cultural capital available to Aaron was composed of socialisation into a techno-culture that valued work/study related tasks, and resources were allocated accordingly, with leisure-based tasks given a lower priority. In a family of six, including five students and a father who regularly used ICT for work, this resulted in limited opportunities to engage in entertainment and play tasks. While Aaron's father and his older sister had their own computers for work and

study, Aaron shared a computer with his mother, second-oldest sister and youngest brother. To maximise his computer time, Aaron and his brother often shared. Aaron discussed playing games online with his brother in this time, although he did not indicate this on his timetabled technology use, instead detailing use for schoolwork during this time, perhaps indicating that his parents were not aware of his game playing. Regardless of this enthusiasm for playing online games, Aaron described a preference for having his older sister complete other computer tasks for him, rather than invest time learning for himself. In contrast, Carly's objectified cultural capital was composed of socialisation into a techno-culture that valued technology generally without placing emphasis on one task over another, while objectifying a set of practices for consuming and creating (older brother). Carly and her older brother had access to a computer each, and there was a transparency around the leisure-based tasks amongst family members. These objectified cultural capitals structured a broad range of ICT possibilities available to Carly, although these were not reflected in her orientation towards ICT use, as, unlike her family, she expressed some indifference to engaging with ICT to practice and rehearse processes of formal ICT literacy.

Emma and Darcy, from non-professional families, shared a positive orientation towards technology and its application in their life. Both girls enjoyed using technology and preferred using Facebook to communicate with their friends. In Emma's home, her mother was the only other family member. She spent large periods online browsing the web and engaging with Facebook. Emma's socialisation into techno-culture was composed of objectified cultural capital shaped by her mother, who valued technology for this set of leisure-based practices, as well as Emma's school related practice. This objectified cultural capital structured the possibilities available to Emma, and was evident, in one sense, in her orientation towards long periods of social media use. Emma discussed her mother's guidance in relation to school tasks, indicating a value attached to Emma's school related practice. This support seemed crucial in shaping Emma's ICT practice and her high level of achievement on the ICT literacy task. In contrast, Darcy's mother was a non-user and her father a low-level user. As a result, the objectified cultural capital in Darcy's home was composed of socialisation into a techno-culture in which her older sisters set the tone for family ICT use. Her sisters spent a substantial amount of unsupervised time using ICT for web browsing and social media (Facebook). This objectified cultural capital structured the possibilities available to Darcy, and was

reflected in her disposition towards long periods of private social media use. Darcy's parents viewed technology as 'a necessary evil', while her sisters valued its role in their lives, a view that was reflected by Darcy herself.

In its institutionalised form, cultural capital refers to formal ICT learning (Selwyn, 2004). All case students except Hamish referred to institutional capital when discussing the technology skills program they participated in at school each week as an important source of their technology learning. For each of these students, this program was important in teaching and/or strengthening ICT literacy practices through explicit skills-based instruction. For Hamish, who achieved the highest ICT literacy score and had access to the broadest set of technological capital at home, the skills-based program reinforced existing ICT practice rather than introducing new skills and knowledge; thus its role in his ICT practice may have seemed insignificant.

In summary, this exploration of students' available technological capital uncovered a number of subtle ways in which underlying structures may work to enable or constrain present and future ICT literacy practice. The role of economic capital is most important in that it provides material resourcing, followed by the critical role of social and cultural capital to ensure effective access to such resources. More specifically, cultural capital, in its embodied and objectified forms, structures a student's technological habitus and available ICT related possibilities. Practices within these given 'possibilities' are further shaped by a students' available social capital in terms of their available network of technological contacts and support. For example, access to a broad set of technology related practices (cultural capital) and a network of skilled, confident and knowledgeable technological contacts (social capital) can support stronger ICT literacy (practice) compared with access to a narrow set of technology related practices (cultural capital) and a network of unskilled or low-skilled technological contacts (social capital). Further, those students who come to school with a stock of technological capital closely aligned to schools' values and formal processes of ICT literacy experience, and who experience a broad range of ICT practices at home, bring a familiarity and connection with ICT that in turn further builds their technological capital set. For those students whose technological capital is mismatched or not valued in the system of exchange, and who use ICT solely for leisure-based activities that do not overlap with the more formal processes of ICT literacy, playing the game of school becomes difficult and

accumulating further technological capital challenging. Although each student acquired the symbolic capital of ICT literacy, to varying degrees, they did not do so in the same way, nor did they have access to the same resources, support and possibilities. Participants' available capital had a structuring impact on their technological habitus and practice (agency). Further, their technological habitus use reflected the fields in which it was acquired. Accordingly, an exploration of students' home fields in relation to their ICT practice is discussed below.

3.3 Field

For Bourdieu, to understand a social phenomenon it is necessary to examine the social space or field in which interactions, transactions and events occur. The field consists of positions occupied by agents, and what happens in the field is consequently bound. As a result there are limits to what is possible, shaped by the conditions of the field (Jenkins, 2002; Thomson, 2012). In context of this study, the participants' ICT literacy practices were the social phenomena and their homes were the field of focus in which technology interactions, transactions and events occurred. The focus on primary students' home fields was taken when defining the research object as the study is concerned with providing rich qualitative accounts of students ICT literacy to enrich large scale assessment data (ACARA, 2015; OECD, 2010), which consistently shows patterns of ICT literacy performance associated with family background. As well as, the young age of the participants and the significant role of family in shaping experiences at this stage of their life. The students' home fields illustrated the complex interplay of culture of technology use, rules surrounding use and positions that shaped ICT practices. Cross analysis of home fields highlighted similarities and differences between the objective conditions that came to enable or constrain participants ICT use, understanding and literacy practices.

The culture of technology use in participants' home fields was both varied and complex. The ICT practices of parents and older siblings played an important role in creating this culture, framing possibilities in varying degrees across families. For Darcy and Emma, whose parents both worked in non-professional occupations, the culture of technology practices was limited to entertainment, leisure and children's homework tasks. While there was an emphasis on social networking and Internet browsing in both participants'

homes, Emma spent time talking with her mother and seeking guidance in relation to her homework. Darcy did not mention this type of interaction with her parents. For Hamish, with both parents working in a professional occupation, and Aaron, with one parent working in a professional occupation and the other engaged in full-time study, the culture of technology use included a variety of practices related to work, home administration, entertainment and leisure. While there were a wide variety of practices in these homes, priority was given to ICT use for work and study over other purposes. In Adam's home the techno-culture also placed emphasis on computer use for work and study over other purposes, and the practices of his parents were often limited to work-based tasks. In Carly's home field there were a variety of practices, as in the home fields of Aaron and Hamish; however, Carly expressed no priority or value attached to one task over another.

For Bourdieu a field is structured internally in terms of power relations. Positions stand in relationships of domination, subordination or equivalence to each other by virtue of the access they afford to the goods or resources (capital) of the field (Jenkins, 2002). The analogy of the football field is a useful tool in understanding this concept. A football field is a boundaried site where the game is played. To play the game, the players have set positions. What players can do and where they can go in the game is determined by their field position (Thomson, 2012; Webb et al., 2002). In the case of Adam, Aaron, Hamish and Carly, from professional families, all parents held positions of power within their home fields. For Emma and Darcy, from non-professional backgrounds, the power positions in relation to ICT were different. The power relations in Darcy's home were well defined, although her parents did not hold positions of power in terms of ICT use, because of their lack of technological capital. Instead, Darcy's oldest sister, who had the largest accumulation of technological capital, held this position, setting the tone for family use. For Emma, who lived with her mother, these defined positions in relation to technology practice were not as clear. While Emma and her mother both had a high frequency of technology use during a regular week for leisure activities, Emma's use of technology for schoolwork took precedence over her mother's leisure activities, while her own leisure activities did not; this indicates a shift in power over resources based on the task purpose along with an acknowledged value of school related tasks over leisure.

Power struggles over resource allocation between siblings were evident in Adam's and Aaron's home fields. Adam and his brother were required to share resources, which was often a source of conflict between brothers "we like to do the same things, but we fight over the computer a lot" (student reflection interview). Adam described winning these struggles due to his position as older brother in the field. In contrast, Aaron's subordinate position in his home field placed time restraints on his computer and Internet use. Aaron and his younger brother were the youngest of four siblings. Aaron shared the family computer with his mother, older sister and younger brother. His position in the family as second youngest sibling afforded him access after his mother and sister. As a result, Aaron often shared his computer time with his brother, during which he played online games. Through this shared preference and family time restraints, they developed a much more harmonious shared practice than did Adam and his younger brother. In Carly's and Darcy's home fields, there was no struggle over resources, as parents and children had access to their own computers. In Hamish's home, he shared a computer with his sister, although they both had additional access to their parent's work laptops, so there was no conflict over resources.

Family members who held power positions were responsible for setting the tone of technology use. This was demonstrated through varying levels of rules and control, ranging from homes with no rules or general guidelines through to strict, authoritative rule sets. These rules surrounding the students' ICT practice guided and informed what was possible. Parents with professional backgrounds set rules and limitations around use to varying degrees. In Adam's family clear rules and time limits were enforced, and Adam showed frustration when discussing these restrictions, [when im older] "I get to do more stuff because I'm not at my home with my parents and my parents won't tell me to get off all the time" (student reflection interview). Similarly, Aaron's home field was bound by rules and time limits. However, time limits were often a result of resource allocation rather than control. There were rules and expectations in Hamish's home around technology use. Hamish and his younger sisters' ICT use was structured around school, extracurricular activities and sporting activities. Hamish's busy schedule left little time for ICT use, and when he did use the computer for leisure he would do so when he had a short period of time that was not conducive to school-related tasks,

> In the afternoons I usually do homework and sometimes games if I've finished. But in the morning, yeah I always play games in the morning because there's not

> enough time to do work but in the morning you can just play a few games (student reflection interview).

There was a high level of transparency surrounding all family members' ICT use in Hamish's home. Carly did not discuss rules or restrictions upon her ICT practice, which was different to the other participants from professional families. However, Carly also had a clear understanding about the types of tasks her family members were engaging in. All the family's computer and Internet access occurred in shared spaces. Carly and her older brother had their own Facebook accounts, while this was not allowed in the other professional family homes.

In contrast, there were no distinct rules in Darcy's and Emma's homes, and both girls spent large periods online engaged with their Facebook account. Darcy's older sister had set a number of practicing guidelines (for example, 'don't download viruses'). The majority of Darcy's ICT use occurred in private bedroom spaces for large unsupervised periods. Emma did not discuss any rules around ICT use or time restrictions. However, unlike Darcy's, Emma's computer use was always in a shared family space.

These findings illustrate how the objective conditions of the home field, including culture of use, power relations, rules and limitations, can shape ICT practice. The culture of technology use within a field exposes students to certain possibilities in terms of existing and future technology practices. For primary students, the techno-culture that they are inculcated into is often limited to the fields of home and school. As students grow, so does the number of fields in which they operate and, accordingly, their exposure to technology related culture and capital. In this sense the home field and culture of technology use will have a critical impact upon a primary student's ICT practices and corresponding level of ICT literacy (at this point in time). Relationships and power struggles within home fields were complex. While on the surface parents are traditionally considered to hold power positions in home fields, in terms of ICT practice parents and their children held varied power positions linked to their own ICT practices and understanding (technological capital). Family members holding power positions were responsible for setting the tone of technology use. This was demonstrated through varying levels of rules and control, from no-rule, open-practice fields to strict rule sets in authoritative fields. In this way, differences in family ICT rules guided and informed differing ICT practices and possibilities.

4 Discussion

The purpose of this study was to investigate primary students' home experiences with ICT to better understand their ICT literacy practices and possibilities. Case study data was collected in the form of a qualitative questionnaire about participants' home ICT experiences, a school-based ICT literacy task, post-task reflective interviews and student conducted family technology interviews recorded in a class blog. The Bourdieuian methodology employed in this study allowed the "mapping of objective structures and spaces of position(s) alongside the immediate lived experiences of participants in order to explicate the categories of perception and appreciation that structure their action from the inside" (Bourdieu & Wacquant, 1992, p. 10-11). Specifically, data was characterised in terms of the constructs of habitus, technological capital and field to gain a deeper understanding of students' ICT literacy practices, including both the structures and dispositions that may come to enable or constrain ICT literacy practices.

This following discussion builds on the theoretical analysis in Section 3 to consider both the structured and generative nature of participants' ICT practices. The discussion first explores the notion of technological habitus in reference to the popular perceptions of children and ICT, followed by a discussion of how participants' ICT literacy practices reflected reproduction, restriction and transformation in the context of the larger field of power.

4.1 Technological habitus?

Much of the popular 'digital native' rhetoric is based on the broad assumption that all young people have a natural talent and motivation to engage in intense technology use across all aspects of their lives (Oblinger & Oblinger, 2005; Prensky, 2001a, 2001b; Tapscott, 1998). Such a notion suggests that young people share a homogenous orientation towards technology, or a 'technological habitus', and that this orientation, inculcated through sheer exposure to ICT, results in an intuitive ICT competence. In contrast, the findings of this study investigating the ICT literacy practices of six primary students suggest that young people do not share a universal technological habitus; instead their ICT practices are varied, complex and socially mediated in nature.

Students' habitus was generative of the type of ICT activities they were inclined to actively seek out, engage in and learn about. While on the surface all case students 'liked' using ICT for entertainment and leisure, a deeper analysis of their practices and preferences revealed a real variation in participants' orientation towards ICT. Hamish, Adam, Darcy and Emma demonstrated a technological habitus through ICT interest, time investment and experimental learning. However, this commitment and motivation was not demonstrated or discussed by Aaron or Carly, who detailed episodes of both indifference to and engagement with ICT. Additionally, those students who did demonstrate a 'technological habitus', in terms of self-interest and investment in discovery learning at home, demonstrated varying levels of motivation, and, interestingly, such an orientation did not necessarily facilitate sophisticated ICT literacy skills. For example, Darcy and Adam described practices and preferences indicative of a technological habitus, yet Darcy demonstrated an average level of ICT literacy and Adam a low level. Conversely, not all students with strong ICT literacy described a practices and preferences indicative of a technological disposition. For example, Aaron, who discussed practices and preferences indicative of low motivation and indifference not typical of a 'technological habitus', achieved a strong level of ICT literacy. Such a finding suggests that participants' relationship with ICT is far more complex than their own orientation towards ICT, and that simply possessing a disposition towards ICT does not lead to a sophisticated level of competency. Students' habitus is structured by everyday experiences within the family and the school, mediating practices and orienting actions and inclinations (Czerniewicz & Brown, 2014). In this sense, the resources available to students work to structure the possibilities of each child's experience differently. Habitus is both "generative (of perceptions and practice) and structured (that is, defining limits upon what is conceivable as perception and practice)" (Codd, 1990, p. 139). Thus when students discuss learning through experimenting and playing with ICT, it is important to understand that this type of practice is deeply structured by family experiences, which determine available ICT possibilities.

4.2 Reproduction

Reproduction refers to the way ICT can contribute to the social reproduction of dominant social values through the education system, which works to reproduce digital inequalities whilst legitimising certain ICT-based practices (Mills & Gale, 2007). Social

reproduction occurs in the field of education, as school often assumes middle class culture, attitudes and values in its students, and thus students from other backgrounds, regardless of how diverse and rich their experiences, tend to be disadvantaged in the 'game' of school (Henry et al., 1988). For Hamish and Aaron, who scored strongly on the school-based ICT literacy task, the home ICT experiences of their professional families were closely aligned to the values of the school field, and they both experienced the formal processes of ICT literacy in their home contexts. The objectified cultural capital within their home fields consisted of a variety of practices for work, entertainment and home administration tasks. These students both had skilled contacts available within their family home to offer support. This social and cultural capital contributed to the overall doxa of technology integration across multiple facets of family life, including work and play, along with critical views of ICT and society, resulting in participants' broader, more measured conceptualisation of ICT practices. Like their peers, these students spent substantially less time completing homework than engaging in play-based ICT practices. Their ICT practice occurred in shared family spaces, which afforded interactions and discussion with technological contacts related to this practice. In Hamish's and Aaron's families, their parents held dominant positions, structuring the field in terms of rules, expectations, resources and effective access. In this sense, parents acted as gatekeepers to technology not only through the supply of material resources, but also socially and culturally through objectified practices and explicit instruction. It seems that these objective experiences, regardless of Aaron's indifference to investing in self-discovery ICT engagement outside of game playing, enabled both Hamish's and Aaron's school-based ICT literacy. In terms of the larger field of power and school, these students and their professional families held more dominant positions than their peers from non-professional families, which allowed them to structure their home fields and children's ICT practices and possibilities to align with school valued and legitimised processes of ICT literacy. As Hollingworth and colleagues (2011) explain, middle class parents tend to be confident users of technology and thus better equipped to support and guide practice. Additionally, within middle class or professional families in the case of this study, value is placed on educational practices, and parents mobilise a variety of social and cultural capital to attain educational success for their children (Crompton, 2006). This finding is reflected by educational sociologists who assert that in the 'field' of education, middle-class families' capital has more value and enables them to secure advantages for their

children over others in the education system (DiMaggio, Hargatti, Russell Neuman, & Robinson, 2001; Hollingworth et al., 2011; Reay, 2004).

For students from non-professional or working class families, the ways in which they see and experience the world tend not to be highly valued in schools or by the schooling system in general (Mills & Gale, 2007). This difference contributes to a mismatch of cultures and values that results for many students in the need to negotiate ICT practices between home and school that are orientated toward different functions (Bulfin & North, 2007). For students who experience a different set of ICT possibilities at home, negotiating the broader set of ICT literacy practices valued within the education and school field is more difficult than for those whose possibilities and practices at home are more closely aligned to school.

This was the case for Darcy, who had less access to the kind of social and cultural capital that worked to enable Hamish's and Adam's stronger school-based ICT literacy. Darcy demonstrated much enthusiasm towards ICTs in general and considered herself a proficient user of ICT. She received a school-based ICT literacy score that was slightly above the class average. However, the ICT practices in her home field were narrower than those of her peers', and largely leisure-based. Neither of Darcy's parents used computers and the Internet for work, and her mother did not use any ICT without assistance from her father. Consequently, much of the objectified cultural capital within the home field came from Darcy's older siblings, whose ICT practices consisted of social networking and schoolwork, which mostly occurred in the confines of their bedrooms. Although her parents had heavily invested economic capital into the ICT material resourcing of their home, their lack of technological capital left Darcy's older sisters, whose knowledge and practices were Darcy's main source of social and cultural capital, to frame ICT use within the field. Thus, the doxic practices in her home field were largely for leisure, and a broader view of its role in society was virtually absent. Value was given to browsing and social networking through the allocation of large periods of unsupervised time. As with her peers from professional families, schoolwork was allocated a smaller portion of time than play-based or communication ICT practices. However, much of Darcy's engagement with ICT occurred in isolation from family members in her bedroom.

In Darcy's working class family, her older sisters held dominant position in relation to ICT, structuring the field in terms of possibilities and general guidelines for practice. While her parents demonstrated that they valued education and desired to assist their children through the provision of physical access, they did not have the social and cultural capital to structure effective access or 'unlock the gate' in the same way as the parents from professional families. This culture and the associated possibilities were reproduced in Darcy's habitus in how she structured her own ICT practices and, importantly, how she conceptualised possibilities available to her with ICT. In terms of the larger field of power, Darcy's family held a more subordinate position compared to her middle class peers. For Darcy's family the culture and funds of knowledge were different from those in school; thus, despite her parents' efforts to provide their children with multiple resources to facilitate technology use for educational purposes, the school agenda was not integrated with the culture and practices of the home (Grant, 2011; Lewin, Mavers, & Somekh, 2003).

Darcy often made explicit reference to the school skills program when discussing her ICT literacy, illustrating the role this direct instruction played in her accumulation of the symbolic capital of ICT literacy. In addition, her conceptualisation of uses of ICT in her future life were directly linked to observable practices of the class teacher with the interactive whiteboard and photocopier. The only adults whom Darcy regularly observed using technology were teachers, drawing attention to the role of the classroom teacher in conferring capital, particularly for those students who may not experience these types of practices elsewhere.

In summary, the stories of Hamish, Aaron and Darcy are suggestive of the reproductive nature of family ICT practices associated with the digital divide (OECD, 2010). For participants from professional families, a culture of technology use and the accumulation of technological capital was closely aligned with the value placed on formal processes of ICT literacy in the school field. In this case, possessing valued technological capital allowed Hamish and Adam to more easily operate within and decode dominant cultural forms in school and society (Webb et al., 2002). In contrast, the doxic practices and accumulation of technological capital within Darcy's home field was mismatched to the school field and the value placed on formal processes of ICT literacy. Therefore, negotiating practices between home and school was difficult,

ultimately working to reproduce the narrow set of ICT possibilities available to Darcy within her own habitus and ICT practice.

4.3 Restriction

Not all students from professional families demonstrated ICT practices indicative of the above class-based binary. Both Carly and Adam, who were from professional families, achieved a school-based ICT literacy score below the class average, which was not typical of patterns of ICT literacy achievement commonly associated with family background (ACARA, 2012b; OECD, 2010). Instead, an examination of Carly's ICT experiences revealed a habitus, expressed as indifference to engaging with ICT, that seemed to restrict her school-based ICT literacy given the available support and resources in her professional family home. For Adam, who demonstrated the lowest level of school-based ICT literacy amongst the six participants, both the low technological capital accumulation of his parents and restrictive rules around ICT practice and Internet access worked to structure a narrow set of ICT possibilities. Regardless of Adam's technological habitus, expressed as a desire to learn more and engage in self-discovery ICT practices when permitted, this narrow set of ICT possibilities seem to have constrained his school-based ICT literacy.

4.4 Transformation

Individuals with a more transformative habitus recognise opportunities for improvisation and act in ways to transform situations. What one may be unaware of or experience as incapacitating, another may see as generative of opportunities for self-enhancement or self-renewal (Mills, 2008). Emma, from a non-professional, single-parent family, achieved a strong school-based ICT literacy score, outscoring a number of her peers from professional families. This result was not typical of the literature detailing patterns of ICT literacy achievement related to socioeconomic status (OECD, 2010) that indicate a broader function of social reproduction. Instead, Emma's narrative was one of transformation. Details of the practice and agency of Emma's mother revealed the ways in which her home ICT practices were structured to inculcate a technological habitus, generate opportunities and transform practices.

Emma's mother was a confident, regular user of ICT for a narrow set of practices, based on leisure/social media. However, Emma discussed learning a number of school-legitimised ICT practices from her mother. For Emma, engaging with her mother in this way provided her access to cultural and social capital that, regardless of limited material wealth, translated into a stronger ICT literacy score within the school field. This interaction was indicative of her mother's orientation towards and value for education. This inclination on her mother's part structured the field differently to Emma's peers from non-professional families, in turn structuring Emma's habitus through a doxa that more closely aligned with the school field in terms of the notion and processes of ICT literacy. Likewise, a recent study of adult learners, who would traditionally be considered non-users of ICT users, details how access to forms of social and cultural capital, in the form of support, can be leveraged to shape a more technological oriented habitus based on the demands of formal education, thus demonstrating student agency (Czerniewicz and Brown, 2013). Emma's mother's investment in her daughter's learning disrupted typical class patterns of engagement and could be considered to be an important factor Emma's ICT related achievement in school (Grant, 2011).

4.5 Summary

The stories of Hamish, Adam, Aaron, Carly, Darcy and Emma are varied and complex. While each student acquired the symbolic capital of ICT literacy, to varying degrees, they did not do so the in the same way. The six ICT experience narratives presented in this results chapter were analysed through a Bourdieuian lens to reveal a number of important findings in relation to primary students' ICT literacy practice that looks beyond the binary 'digital divide' to highlight episodes of agency and struggle that can contribute to digital inclusion and exclusion. In summary, all children 'played' with ICT; however, not all discussed this play as a source of self-discovery learning, and the extent to which they demonstrated a disposition to engage in ICT play and self-discovery was varied. Furthermore, when the students in this study discussed learning how to use ICT through play, by 'fiddling' or 'mucking around', a deeper analysis uncovered how the varied possibilities available in students' home contexts worked to objectively structure these episodes of self-discovery, rather than students learning through simple immersion and repetition. These findings draw attention to the significance of a student's home environment and accumulation of technological capital,

together with their orientation towards ICT in structuring and generating ICT practices and possibilities.

For all the participants, parents or older siblings acted as gatekeepers to ICT skills and knowledge. Those parents who were confident users of ICT and familiar with the values and ICT practices of the education system seemed to do this organically, compared to those parents who were less skilled with ICT and/or familiar with the dominant ICT values and practices of the education system. In this sense, Darcy's and Hamish's stories were indicative of the classed patterns of ICT literacy that reflect larger mechanisms of social reproduction (ACARA, 2012b; MCEECDYA, 2010; MCEETYA, 2007; OECD, 2010). However, the rich stories of Carly, Adam, Emma and Aaron also provide details of agency and structures outside of these patterns that worked to enable or constrain ICT practice and, in turn, school-based ICT literacy, including parental social investment/educational value, parental control and student indifference towards ICT, as well as ICT experiences and technological contacts within the school field.

Theoretically, this research applied Selwyn's (2004) conceptual extension of technological capital together with concepts of habitus and field (Bourdieu, 1984) to provide a holistic methodological and analytical framework for understanding ICT practices. The subset of technological capital conceptualised by Selwyn (2004) offers a lens through which an understanding of available resources may influence practice. However, no cultural practice is explicable without an understanding of cultural field and habitus (Webb et al., 2002). Both habitus and field are relational structures, and it is the relation between these relational structures, investigated in this study, that provides the key for understanding practice (Maton, 2008). The further development of Selwyn's framework to include concepts of technological habitus and students' home field allowed the researcher to uncover structured and generative structures that come to enable or constrain students' practice in terms of the dominantly valued notion of ICT literacy.

5 Suggestions for future research

The qualitative application of the theory of practice has provided detailed understanding of the ICT experiences, practices and possibilities, negotiated between home and school, of the six case students revealing the deeply social nature of ICT literacy practices, what is needed now is the broader application of the framework to larger, more complete data sets, including parents and teachers as participants. In addition, the extension of the empirical lens to include analysis of other fields, for example, peer group field or sporting field, within which students act offers the potential to further enrich large scale data and understand the ways ICT literacy possibilities are shaped.

6 Limitations

The limitations of these results include the self-reported nature of the data, the classification of professional and non-professional families and the small set of participants. Data collected from participating students consisted of a qualitative questionnaire, an ICT literacy task, semi-structured reflective interviews and student blog tasks. Apart from the ICT literacy task, all data was self-reported accounts of use and engagement that included the views of students' parents and siblings captured by the participants themselves during family interviews that were conducted as part of the in-school blogging tasks. Criticisms around the self-reported nature of the data include participants reporting accounts that they believe to be socially acceptable, along with issues around memory and consistency (Merriam, 1998). The researcher attempted to overcome these criticisms with multiple sources of evidence, allowing a cross-checking process between sources. Additionally, any data collected in relation to family practices was completed at home with parents, as a form of member checking that allowed data to be checked for accuracy and reliability (Yin, 1994).

It is also acknowledged that while the classification of professional and non-professional families based on broader groups of occupation categories alone is simplistic, there is no single correct measure of socioeconomic status. However, the Australian Standard Classification of Occupations (ASCO) schema is one measurement that has been used in government and academic research in Australia since the mid-1980s (Marks, 1999). Despite criticisms, occupational class schemes have been found to

be invaluable proxies for economic ‘classes’ (Crompton, 2006). Additionally, broad classifications of social class used in other studies have been described as a necessary and useful heuristic in the explication of the textures of families’ engagement with technologies (Hollingworth et al., 2011).

While case students’ stories provide thick contextual description about their ICT experiences in the context of their school-based ICT literacy, the findings present only one circumstance, and it is unlikely that they will be replicated in another context. It is acknowledged that this study serves to further understand how students’ backgrounds come to structure their technology use but not make generalisations.

7 Conclusion

This chapter presented detailed accounts of six primary students’ experiences with ICT. The aim of this chapter was to characterise primary students’ home ICT experiences and school-based ICT literacy in terms of habitus, field and technological capital to uncover individual and contextual factors that shape ICT literacy practices and possibilities. The results presented in this chapter suggest that primary students’ ICT literacy practice is diverse, structured by individual dispositions, socially mediated and bound by the fields in which it occurs. Furthermore, family members, the nature of the home field and available technological capital are critical in structuring students’ current and potential ICT practice. While the ‘digital divide’ highlights patterns of ICT literacy achievement associated with family background (ACARA, 2012b; OECD, 2010; Ritzpauht et al., 2013; van Deursen & van Diepen 2013), this detailed investigation shows that family technology practices are nuanced and not always reflective of a binary divide.

A closer analysis revealed that families that used and valued ICT for a variety of purposes and had parents who regularly used ICT for work, resulting in a stronger set of ICT skills and knowledge, were better equipped to share, guide and support their children, confer technological capital and support stronger school-based ICT literacy. In these families, children tended to use ICT in shared family spaces and engaged in shared ICT practices with their parents. In contrast, families that used ICT for a narrower set of practices, mainly focused around leisure, and that had parents/guardians

who did not use ICT for work, and had lower levels of ICT skill and knowledge and were less equipped to guide and support their children and confer technological capital. In these families children tended to use ICT in private locations not conducive to shared ICT practices and learning, and the children often set the tone for ICT use. Collectively, these factors seem to constrain school-based ICT literacy. In general, the structuring role of parents, teachers and siblings upon students' habitus worked to shape their ICT literacy practice. However, primary students' orientation towards ICT use and engagement also played an important role in generating ICT practice and possibilities. For example, some students' ICT practices and preferences indicated a technologically oriented habitus, which allowed them to benefit from their available technological capital. Others' ICT practice and preferences suggested an indifference to engagement with ICT, regardless of their available stock of technological capital.

Critically, the ICT experiences and school-based ICT literacy of the students in this study highlighted how ICT can contribute to social reproduction, transformation and restriction. This understanding of both the diversity and nuanced complexity of primary students' ICT practices in the context of the larger field of power draws attention to the fundamental role of the school in the development of ICT literacy for all students. Importantly, from an educator's perspective, understanding the differences in the resources students bring to school in terms of ICT practice represents an opportunity to connect to learners worlds and tailor learning experiences to provide students with the additional capital they need to build their ICT literacy. The integration of such programs to support the ICT components in the new Australian curriculum is critical. Such strategies are necessary to ensure that students who have not acquired school valued forms of ICT literacy at home have the opportunities to develop the necessary knowledge, skills and dispositions to transform ICT practices, rather than contribute to the reproduction of digital inequalities.

CHAPTER EIGHT

Conclusion

This final chapter draws the results chapters together to answer the study's guiding questions and relates them to other relevant empirical studies. The chapter provides a deeper understanding of the 'digital divide' by detailing the ways in which differences in primary school students' ICT experiences at home can work to enable or constrain their school-based ICT literacy practices. The chapter moves on to consider the study's theoretical and practical implications; this aims to better inform the design of pedagogies that promote digital inclusion rather than reinforce existing inequalities. Limitations of the study are also considered, followed by suggestions future research.

1 Introduction

This chapter discusses the outcomes of the study, first, by detailing and discussing the findings in relation to each of the research questions. This is followed by sections that discuss the theoretical and practical implications and potential directions for further research. The chapter concludes with a brief summary.

The study was guided by the broad research question: How do primary school students' ICT experiences shape their ICT literacy? From this central question, three sub questions were developed:

1. How do Year 6 primary school students perform in terms of their school-based ICT literacy practices?
2. How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?
3. What is the relationship between a Year 6 primary school student's family background and their ICT literacy practices?

A qualitative case study approach was used to investigate the ways in which differences in primary school students' ICT experiences shaped their school-based ICT literacy practices. The study employed the theoretical lens of Bourdieu's theory of practice (Bourdieu, 1984) to uncover details of structure and agency that shaped ICT practices and possibilities, while highlighting students' perspectives in exploring and explaining their own ICT literacy practices. The data collection strategy, conducted across threes phases, was embedded into class lessons in one Year 6 classroom. Data from Phases 1 and 3 consisted of a background questionnaire about students' home ICT experiences, a digitally captured ICT literacy task and family technology interviews conducted by students and recorded in a class blog. All students in the class participated in Phases 1 and 3 of the study. Data from Phase 2 consisted of semi-structured reflection interviews, during which six selected participants each reflected on their ICT literacy, based on the digitally captured ICT literacy task in Phase 1. Results from the three phases of the study have been presented in detail in Chapters Four, Five, Six and Seven. This chapter presents the overall findings by explicitly answering each research sub-question; this is followed by a discussion of the theoretical and practical implications of the study's

findings. Limitations of the study are then presented as well as potential areas for further research. Finally, the chapter concludes with a summary of the key findings.

2 Overall findings

2.1 Research Question 1: How do Year 6 primary school students perform in terms of their school-based ICT literacy?

This study measured primary students' school-based ICT literacy to provide qualitative detail of how students perform during a school-based ICT literacy task. The aim of the ICT task was to measure students' ICT literacy, focusing on the six key processes of ICT literacy used in the Australian National Assessment Program of ICT literacy: accessing information, managing information, evaluating, developing new understandings, communicating with others and using ICT appropriately (MCEETYA, 2007). The ICT literacy task was scored using digitally captured screen recordings and student artefacts. Student results were analysed and scored against a rubric and then compared across sub-tasks to identify areas of strength and weakness in terms of the six processes of ICT literacy. The findings showed that overall student performance was not consistent with what might be expected of a group of primary students, who are commonly considered to universally possess sophisticated skills and knowledge of ICT in the popular discourse, despite the body of research evidence that disproves such claims (Samuelsson, 2012; Thrupp, 2008; van Deursen & van Diepen, 2013; van Deursen, Görzig, van Delzen, Perik, & Stegeman, 2014; van Dijk, 2005). The average student score was 13.5/23 (59%), and student performance illustrated a diverse range of ICT literacy strategies, skills and approaches across the working processes of ICT literacy. Patterns of performance relating to family background also emerged within the results. These characteristics of students' ICT literacy are discussed in detail below.

2.1.1 ICT literacy achievement was not indicative of a homogenous group of highly skilled ICT users

The primary students completing this task could not be considered a homogenous group in terms of their ICT literacy practices. Students' ICT literacy practices were diverse

across the processes of ICT literacy. While comparison of task results illuminated students' generally mediocre performance scores, with an average student score of 59%. The highest score was 19 out of 23 (83%) by Harry, from a professional family background, and the lowest score was 8 out of 23 (35%) by Kylie, from a non-professional background. Students engaged in a variety of approaches and strategies while completing the task. This range of practices included frequent idle periods with limited focus on the task, resulting in poor overall performance, through to *accessing* and *managing information* with some confidence, although demonstrating an inability to synthesis key ideas to *create and share information,* and ultimately to a small number of students who confidently and critically engaged with content across all six processes of ICT literacy involved in this task. The variation found in this study parallels the growing body of evidence that highlights the complexities of young people's ICT literacy (Samuelsson, 2012; Thrupp, 2008; van Deursen & van Diepen, 2013; van Deursen, Görzig, van Delzen, Perik, & Stegeman, 2014; van Dijk, 2005).

2.1.2 Student performance varied across the processes of ICT literacy measured.

Analysis of the students' outcomes, processes and reflections captured variations in students' performance across the six processes of ICT literacy measured. On average, students' performance was strongest when undertaking the *accessing* and *managing information* processes. In contrast, low to moderate performance scores were recorded by almost all students across the remaining tasks, reflecting lower levels of ICT literacy for the *evaluating, developing new ideas, communicating with others* and *using ICT responsibly* processes.

Students *accessed* and *evaluated* information from the two teacher-provided sources most confidently, with an average student score of 61%. Students demonstrated less certainty when *accessing* and *evaluating* information to select their own web source and locate appropriate information, with average scores of 47% and 48% respectively. This suggests that the teachers' scaffolding was important in assisting primary students to access an age appropriate source so that they could first understand the information to select the most appropriate facts for their information need.

Students' ICT literacy was the weakest for *evaluating information* and *using ICT responsibly,* which required them to provide justification for the appropriateness of their chosen source. The average student score for this task was 15%, with most students being unable to make critical reflective judgements about the integrity, relevance or usefulness of their information source while completing the task. This stratification of skills is consistent with previous research findings that students exhibit greater skill in consuming information than in evaluating and producing information (Claro et al., 2012; Samuelsson, 2012; van Dijk, 2005).

In general, the students in this study who achieved higher scores were able to demonstrate a sound performance across all of the processes of ICT literacy measured. These students demonstrated both basic and higher order critical and creative skills. Lower-performing students demonstrated basic skills; however, their engagement in any critical and creative processes was limited. Students who received mid-range scores of 50-70% demonstrated basic skills, as well as varying levels of critical and creative skills. Those students who were able to evaluate information tended to perform better on the *developing new understandings* and *communicate with others* processes of ICT literacy. Those who did not demonstrate evaluation skills were limited in their capacity to *develop new understandings,* highlighting the hierarchical and interdependent nature of the processes. This meant that performing in some processes required the sub-ordinate skills and knowledge required for a more basic process. For example, to *develop new understandings*, students must first be able to *access* and *manage information* and then e*valuate* that information. Importantly, any performance of critical and creative tasks (*evaluating information, developing new understandings & communicating with others*) first requires an individual to engage with basic skills and knowledge to *access and manage information*. Thus, any measure designed to capture higher order critical and creative processes of ICT literacy will by nature first require engagement with *working with information* processes. This is typical of ICT literacy assessments (Claro et al., 2012b; OECD, 2010; van Deusen & van Diepen, 2013) and reflects of the progression in the modules used in the National Assessment of ICT literacy in Australian schools (ACARA, 2015)

The results of this study are similar to findings of the Australian National Assessment of ICT literacy, which found a high proportion of school students could complete concrete, skills-based computer tasks using conventional software, while a smaller proportion were are able to use software functions creatively to reconstruct information for communicative purposes (ACARA, 2012b). Further, the emerging body of research evidence illustrates the conditional nature and increasing complexity of ICT skills and competencies encompassed in the broader construct of ICT literacy (Claro et al., 2012; Goldhammer et al., 2013; Jun, Han, Kim, & Lee, 2014; Kim & Lee, 2013; van Deursen & van Diepen, 2013). The complex and hierarchical nature of ICT literacy suggests that simply providing students with opportunities to use ICT will not result in the acquisition of critical and creative skills unless they possess the basic skills required for these higher order processes. This draws attention to the significant role of primary education in explicitly developing a strong foundation in ICT literacy skills.

2.2 Research Question 2: How can the ICT experiences of Year 6 primary school students be characterised in terms of Bourdieu's theory of practice?

Bourdieu's theory of practice acts as a set of thinking tools for analysing 'life worlds' of individuals through empirical investigations (Bourdieu & Wacquant, 1992). The theory describes practice as a result of the relationships between an individual's disposition (habitus) and position in a field (capital), and the current state of play of that social arena (field). Data was collected to capture students' ICT experiences in terms of this pragmatic lens; that is, the student's and family's ICT practices, including available technologies, location of technologies, technology uses and preferences, family composition, parental occupation, technology learning experiences and support. The study aimed to explore the role of students' dispositions, family ICT experiences and home environment upon their ICT literacy practices and possibilities. These key findings are discussed below in terms of habitus (2.2.1), field (2.2.2) and capital (2.2.3). Each theoretical construct is explored discretely; however, it is important to note that this separation has been artificially applied to present a summary of findings. This discrete analysis is then drawn back together in an analysis of family groups, presented in Section 2.3.

2.2.1 Habitus: Students share similar preferences but different practice and motivation

For Bourdieu, it is habitus that orients an individual to act (Bourdieu, 1977). In relation to technology practice, habitus can be described as practices and personal dispositions or inclination toward the use of technology. Habitus is both structured and generative: structured by an individual's past and present circumstances, and generative as it works to shape present and future practices (Maton, 2008). Therefore, young people use technology according to what fits their habitus (Bourdieu, 1991). Although habitus cannot be directly observed in empirical research, it can be 'apprehended interpretively' (Reay, 2004, p. 439). Bourdieu himself demonstrated this through his own research study *Distinction*, with a qualitative focus on preferences and practices to interpret the underlying characteristics that contribute to an individual and group habitus (Bourdieu, 1984). This study applied similar ideas to focus on students' technology practices and preferences in an attempt to understand individual and collective student habitus, including likes, time spent, purpose, motivation and confidence, to capture a glimpse of habitus and the ways in which it structures technology practice both individually and collectively.

In general, students reported similar preferences for technology use, with all students acknowledging that they 'like' using computers and the Internet. While this common 'like' and shared preference for using ICT has been detailed elsewhere in the literature (Barron et al., 2010), further investigation of students' engagement with technologies uncovered a more nuanced understanding of individual student and gender-based preferences and their structuring role on practice. Gender preferences are described in Chapter 4, focusing on background questionnaire data, and individual student preferences are unpacked through detailed student case studies in Chapter 7.

Differences between practices based on gender emerged in relation to preferred activities and time investment. Overall, boys spent the most time engaged in gaming activities, while girls favoured social networking. Boys also spent comparably more time each week engaged in computer-based tasks for leisure, averaging 16.9 hours per week, compared with their female counterparts, who averaged 7.5 hours. These findings are consistent with other research that has found that boys use ICT for gaming for

larger, more intense time periods than do girls (Appel, 2012; Biagi & Loi, 2013; Drabowicz, 2014). Collectively, such findings suggest that boys and girls may have a different technological habitus, with boys demonstrating a preference for gaming and longer periods of engagement, and girls preferring the communicative function of ICT. These preferences, considered together with patterns of ICT literacy that describe high and low ends of achievement for boys and moderate performance for girls, could suggest that longer periods spent gaming may lead to stronger ICT literacy. This association has been illustrated in other studies that have found time and intensity devoted to entertainment activities to correlate positively with academic performance and ICT literacy (Biagi & Loi, 2013). This was not the case for the boys in this study, with two of the strongest performing boys describing low levels of engagement with gaming.

Students' individual engagement with ICT has been found to be both complex and varied (Barron et al., 2010; Robinson, 2014a, 2014b; Robinson & Schulz, 2013). In this study, students demonstrated a range of interest and motivation towards the use of ICT. Students with low motivation to use ICT described a lack of inherent interest as well as outsourcing ICT tasks to other family members. For example, Aaron discussed certain tasks he would rather have his sister complete for him, as it was easier. In contrast, students with higher levels of ICT-related motivation and interest engaged in experimental ICT practices, as well as describing their own agency in seeking active and consistent engagement in additional online fields. For example, Lucas accessed an additional online gaming field, through which he acquired a range of new technological capital. This diversity of practices and preferences highlights two important points about students' technological habitus including the real diversity of students' ICT practices and preferences and the generative role of habitus upon ICT practices.

The generative role of habitus was evident in the study's findings concerned with the orientation students had towards using their available technological capital. While most students' technological habitus tended to reflect the objective conditions of their home fields and available capital, this was not the case for all. Three students' practices provided examples of the generative role of habitus in both restricting and transforming ICT practices. For example, both Carly and Aaron came from professional families, and had access to a range capital and enabling field conditions that potentially supported

engagement in and effective access to a variety of technology practices. Despite this, they expressed dispositions that indicated a lack of enthusiasm towards technology use, orienting them to limited engagement and, in turn, a limited set of ICT practices within their home fields (Chapters Six and Seven). By contrast, Lucas demonstrated an enthusiasm and disposition towards technology use regardless of his much narrower access to capital and limited set of objectified practices for leisure within his home field. His enthusiasm for gaming and creating and sharing instructional YouTube videos afforded him access to an additional online field in the form of an online gaming community where he acquired a range of new critical and creative skills (Chapter Four).

The role of agency in Lucas's practice demonstrated how his orientation towards ICT together with opportunity for experimental practice in his bedroom generated new contacts, possibilities and practices. By contrast, Carly's practice demonstrated how low motivation or indifference can generate lower levels of ICT literacy despite a high level of access to technological capital and objective field conditions that are seen to enable formal ICT literacy in other families. Without this understanding of agency, habitus can be seen as a deterministic construct, objectively orienting individuals to act based only on their existing structured practices and possibilities (Jenkins, 2002). The role of agency is also reflected in Robinson's (2014a) study examining the ICT negotiations of highly motivated students from different family backgrounds. The study's findings showed that low-resourced, highly motivated students were able to exploit school resources, driven by habitus or orientation towards ICT practice, leading to what Bourdieu would consider transformative experiences. These findings suggest that practice cannot be understood by focusing only on one construct in isolation from one another. The key to uncovering practice requires consideration of the complex interplay of habitus, capital and field.

Overall, examination of the practices and preferences of Year 6 primary school students revealed a variety of orientations towards ICT use and engagement or technological habitus. Most students' technological habitus tended to reflect their available stock of technological capital and the objective conditions of their home field, others' habitus generated practice that was different to their home field or did not draw upon their available capital.

2.2.2 Students' ICT experiences were mediated and structured by the different field(s) in which they operated.

Fields, according to Bourdieu, are networks of social relations, structured systems of social position within which manoeuvres take place over resources, stakes and access (Everett, 2002, p. 60). In relation to technology practice, the objective conditions of a field can then be understood as structured systems of social relations objectively shaping students' engagement with and use of technologies. In this study, primary students' ICT experiences were mostly limited to the home and school fields. Therefore, the objective conditions of these fields were significant in structuring the possibilities available. Several structuring field conditions emerged within students' homes in relation to students' practice: rules, power relations, physical location of resources and culture of use. These conditions are described in general terms below, followed by a discussion of patterns relating to parental occupation groups.

For all students, technology use at home was bound by rules imposed by the family members holding the most power. Some students' technology use was closely monitored and restricted; for example, Adam experienced rigid rules limiting his ICT practice. Other students experienced close monitoring with less restriction – for example, Emma shared ICT practices with her mother and invested large time periods engaging with ICT – or limited supervision, guidance or restrictions – for example, Darcy used ICT for large periods of time in her private bedroom space with some guidance from her older sister in terms of appropriate behaviour. Traditionally, family rules are defined and imposed on the family unit by parents or guardians; however, this was not always the case in relation to technology practice. In several families, shifts of power were demonstrated, with the participants themselves or older siblings holding positions of authority and so setting the rules or tone of technology use within the home field. This shift in power seemed to occur as a result of the student or sibling having a greater accumulation of technological capital than their parents or guardians.

Power struggles between family members over shared resources also became evident. In families with shared computer resources, allocation was often organised according to age, with the eldest siblings or parents afforded the most access. Younger siblings were therefore able to spend less time engaging with computer and Internet technologies and

less time developing, refining or rehearsing ICT literacy skills. Recent research has found that ICT proficiency are often linked to a student's age and stage of education (ACARA, 2015; van Deursen & van Diepen, 2013). This study's findings offer one possible explanation for such age-based variation by uncovering the ways in which varied allocation of family ICT resources may shape differences in ICT possibilities and proficiency, based on a child's age and position in the family home. Similarly, other researchers have investigated family negotiations around ICT usage revealing the bargaining, negotiation, cooperation and competition that shape ICT usage practices within the family (Robinson & Schulz, 2013).

The physical location of technologies within the home field also played a structuring role in students' ICT practice, according to the purpose and function of ICT. For example, having access to personal computer in a bedroom compared with access to a shared computer in a dedicated workspace objectifies a differing sense of purpose for the tool. Students who accessed ICT in a dedicated workspace demonstrated a broader conceptualisation of the purposes for which ICT may be used, including formal work related tasks, which are closely aligned with the formal processes of ICT literacy that are valued in school-based assessments. In this way, the physical location of ICT contributed to students' understanding and use of technologies within the home field. Some researchers have explored location of technology use, contrasting home use to other physical locations including school, friend's homes and sporting clubs, finding that ICT practices are bound by the specific purposes for which they are employed (Beckman et al., 2014; Cranmer, Selwyn, & Potter, 2009; Thrupp, 2008). However, the role of the physical location of ICT within the family home, as an objectifying field condition, is an underdeveloped area and worthy of further investigation.

For Bourdieu, the culture of technology use would constitute the unquestioned shared beliefs that an individual comes to accept as natural and legitimate, known as the doxa of the field (Deer, 2012; Webb et al., 2002). The technological doxa in a field includes the ICT practices, attitudes, values and expectations of all individuals within the field. The doxa of 'techno-culture' exposes students to varying possibilities in terms of current and future technology practices. For the students in this study, the doxic practices within their homes were diverse, with differences emerging based on parental

occupation groups. In general, students from professional families were exposed to a doxa of technology integration across multiple facets of life, including work and leisure activities, along with critical views of technology and society, regardless of parental ICT skill levels. In contrast, students from non-professional families were exposed to a doxa of technology use for leisure or entertainment, with parents sometimes holding cynical views of technology, without consideration of its application beyond their particular circumstance. In these home fields, it was common for students to spend significantly more time than their parents using technologies.

Patterns of difference between socioeconomic groups' home ICT use is an important aspect emphasised in the literature (Barron et al., 2010; North et al., 2008; Robinson, 2014; Tondeur et al., 2011; Vekiri, 2010). In this study, differences also became evident through an analysis across parental occupation groups. This study played close attention to the objective field conditions experienced by students (including types of practices, support, power and physical structure of the home environment) to reveal how and why these differences manifested. Students from non-professional families often accessed technologies in private, unsupervised spaces, allowing for more freedom and fewer rules governing their use. Reflective of family doxa, these students described a narrower range of practices and were more likely to use technology for entertainment than schoolwork. By comparison, students from professional families tended to use technology at home less frequently, were monitored more closely and had access to more guidance from better skilled contacts when needed. These students used technology for a wider range of practices than their peers from non-professional families. While they regularly engaged with technologies for entertainment, students from professional families were also engaged in work, home administration and e-commerce tasks with family members. Additionally, these students tended to use technologies in a dedicated workspace or shared family space, suggesting that parents were restricting private use in professional family homes.

In sum, all students' ICT experience and practice was mediated by the objective conditions of their home fields including rules, power relations, location of resources and culture of use. In professional family homes these objective conditions included parents setting rules and tone for ICT use, and shared ICT practices in shared family locations including dedicated workspaces. In non-professional family homes parents

tend to be less skilled, resulting in a shift in power, with children holding dominate positions and setting the tone for ICT use, and children using technology in private spaces less conducive to shared practice. Although most students' experiences followed this pattern, three students' home field conditions and doxic practices differed from these general patterns based on parental occupation groups. These differences were a result of the students' available technological capital and are explored in detail in Section 2.2.3 below. This further demonstrates the nuances and complexities that require consideration of habitus, field and capital together.

2.2.3 Students' ICT experiences were structured by available technological capital, which varied.

Technological capital is an extension or subset of Bourdieu's different forms of capital (Bourdieu, 1997; Bourdieu & Passeron, 1977), conceptualised by Selwyn (2004) to highlight the different resources that structure an individual's ICT practices. This study examined students' accumulation of technological capital to discover how technology experiences are structured. Findings pertaining to each form of technological capital are discussed below.

2.2.3.1 Economic capital

Economic capital refers to material resources available, including the quality and quantity of equipment and the capacity for purchase, maintenance and upgrade of equipment (Selwyn, 2004). To allow for collective analysis of economic capital and socioeconomic status, students and their families were categorised using ASCO classifications based on the highest reported parent/guardian occupation status (Castles, 1986). Of the 25 students participating in the study, 17 students came from non-professional families, with parents employed in unskilled/skilled trade or administration occupations, and eight students from professional families, with parents employed in associate professional/professional occupations.

In terms of material resources, there were no substantial differences in the technology equipment or infrastructure available in the family home. All students had access to at least one computer connected to the Internet at home, as well as a range of other digital

resources. This finding is consistent with census data indicating that Australian households are increasingly connected, with 91% of households with children having access to a home computer and 86% having home Internet access (Australian Bureau of Statistics, 2011). While some students had their own computers, others shared with siblings or all family members. Data about the type of connection and hardware was not collected. None of the students mentioned not being able to access technology equipment that they would like to. Apart from Hamish and Carly, who accessed parents' 'work' laptops, there were no other clear patterns of computer ownership related to parental occupation. However, one student from a professional family background, Adam, discussed his family's capacity to access paid technology support, demonstrating conversion of one capital (economic) for another (social).

2.2.3.2 Social capital

In this study social capital refers to networks of technological contacts and support (Selwyn, 2004). Within home fields, parents and siblings constitute students' technological contacts. Accordingly, the confidence, knowledge and practices of these contacts had a significant influence on students' ICT practice because of the guidance and support they could provide. Eight students described their parents as confident, regular users of technology for a range of practices, including work related tasks. These students were well supported in their technology use, referring regularly to learning from their parents and accessing their help. Similarly, this support role was reflected in a study that investigated factors influencing children's information-seeking for homework found that supportive familial networks can play a significant role in opening possibilities (Cranmer, 2006).

All students from professional family homes had technological contacts living in the family home, resulting in immediate access to support. Five students from non-professional families (Chantele, Karen, Kara, Kylie and Malcolm), accessed support from extended family members living outside the home field. While 4 students (Chantele, Kara, Kylie and Mac) did not describe access to any form of support at home. This type of low-skilled or delayed support can be considered a constraining factor when compared to peers who have immediate access to skilled support.

Within the school field, 13 students referred to the school librarian as a key technological contact. The school librarian ran a weekly computer skills program as part of the class library time. Similarly, Robinson (2014a) detailed the significant transformative role that school contacts can play for under-resourced yet skilled students, highlighting the potential of educators to provide meaningful connections, access to resources and opportunities to practice. These findings highlight the role of technological contacts in supporting effective access, drawing attention to the range of support students have access to and their potential for enabling or, conversely, constraining practice.

2.2.3.3 Cultural capital

In this study cultural capital is referred to in three forms: embodied, objectified and institutionalised. In its embodied form, cultural capital refers to self-interest towards and investment in the development of ICT skills (Selwyn, 2004). Analysis of students orientation and time investment in ICT revealed that, as with habitus, students had a diverse accumulation of embodied capital, with some students committed to learning with ICT through experimentation and prolonged engagement, while others exhibiting little interest in spending time or learning. This diversity in self-interest and investment in the development of ICT skills has been well documented in the literature, highlighting the complex and heterogeneous ways in which students experience ICT (Barron et al., 2010; Eynon & Malmberg, 2011; Robinson & Schulz, 2013).

In its objectified form, cultural capital refers to socialisation into the culture of technology use, structured by the objectified practices of individuals within the field (Selwyn, 2004). The skills, knowledge and practices of family members are considered crucial in structuring possibilities available to students. In this study, students from professional family backgrounds whose family members engaged in a variety of technology practices for work and leisure were objectified (exposed) to a broader set of ICT possibilities more closely aligned with the school-based definition of ICT literacy. In general this was different for students from non-professional families, whose family members engaged in a narrower set of practices for leisure that tended to be misaligned with the more formal processes of ICT literacy valued in the school field. These varied objectified capitals or practices according to family background have been examined in

previous research that investigated how family habitus and digital tastes come to contribute to digital inequalities (North et al., 2008). This research by North and colleagues (2008) found that the digital tastes and values of students from working class families differed from the dominant school field, while students from middle class families shared similar digital tastes and values to those evident in the school field. For these middle class students, such shared tastes and values ensure a ‘feel for the game’, leading to acquisition of further technological capital, while for their working class peers who experience a mismatch of digital taste and values, the same kind of capital accumulation can prove challenging.

In its institutionalised form, cultural capital refers to formal school ICT learning and credentials. Thirteen students referred to institutional capital in terms of the ICT skills program they participated in each week, including the school librarian as an important source in their learning. For each of these students, the ICT skills program played an important role in structuring practice, teaching new skills and/or strengthening existing practices through explicit skills-based instruction. Six of the eight professional family students valued this learning source, as did nine of the 15 non-professional family students. This finding is consistent with other research findings that detail how students consider school an important source of ICT learning (Beckman et al., 2014).

In summary, this study found that technological contacts in both home and school fields played a critical role in structuring practice through the objectification of practices (cultural capital) and the provision of effective access and support (social capital). Specific details of the students’ economic, social and culture capital were presented in Chapter Four, focusing on family background data, and Chapter Seven, which explored in-depth student case studies. The analysis of students’ available economic, social and cultural capital revealed patterns of accumulation related to parental occupation groups, in terms of social and cultural capital. Differences in social and cultural capital structured family technology culture accordingly. Students from professional families had greater stocks of technological capital, which were better matched to the school field, than did their peers from non-professional families. For example, students from professional families were exposed to a range of practices for work, home administration and leisure, and their parents were skilled users of ICT, while students from non-professional families were exposed to ICT practices for leisure, and parents

and siblings were less skilled, often resulting in the need to access to support outside of the family home. The broader set of technological capital of professional families was more closely aligned with formal processes of ICT literacy than the narrower set accumulated in non-professional families. For the students from non-professional families, their technological capital was mismatched, and thus negotiation between home and school ICT practices was more complicated. This study also found, however, that the capital accumulation of three students lay outside of the general patterns of ICT practice between professional and non-professional families. These differences and their significance are explored in detail in Section 2.3.

2.3 Research question 3: What is the relationship between a Year 6 primary school student's family background and their school-based ICT literacy practices?

As discussed in Chapters Five, Six and Seven, ICT literacy is more complex than a set of skills or processes: it is embedded in a social context. Examining ICT literacy from a Bourdieuian perspective uncovers the ways in which ICT literacy is a social practice bound by context (field), dispositions (habitus) and available support and resources (capital). The results of this study provide insights into how students' school-based ICT literacy was linked to their home experiences and practices. While a general pattern of practice according to family background was evident, subtle variations emerged in three particular students' ICT practices that did not fit this general 'class-based binary'. This is discussed below.

2.3.1 Patterns of practice and ICT literacy according to family background

Gaining a better understanding of the patterns of ICT literacy associated with family background identified in the literature (ACARA, 2012b; MCEECDYA, 2010; MCEETYA, 2007; OECD, 2010) was a key focus of this study. Accordingly, student ICT literacy scores were analysed in relation to parental occupation categories. In general, students from professional families received higher ICT literacy scores than their peers from non-professional families.

In an attempt to understand what might lead to this variation between family groups, data was collected about family ICT practices. The analysis of these practices using the theory of practice (Bourdieu, 1984) uncovered general patterns of structure and practice between family groups. These general differences included culture, location, rules, power, users, uses and available support. These structuring factors, detailed in Table 37, work to shape students' ICT practices and possibilities in different ways and contribute to digital inclusion for some and exclusion for others.

Table 35. General patterns of variation in family group ICT experiences

Differences		**Professional families**	**Non-professional families**
Average student ICT literacy score (%)	Class average 60%	67%	56%
Field	Doxa	Technology culture that values ICT use for a range of practices; work and school tasks are allocated priority over leisure-based tasks	Technology culture that views the provision of ICTs important for their children; parents often ill-equipped to support this idea Value placed on leisure and entertainment tasks
	Location	Dedicated work spaces Little private access	No dedicated work spaces Access in private spaces (e.g. bedrooms)
	Rules	Parental supervision, rules and expectations	Low – no parental supervision
	Power	Parents set rules and expectations for use	Siblings and students set expectations for use
Technological capital (cultural and social)	Users	All parents confident, regular users of technology Time spent using technology is greater for parents than their children	Range of parental ICT skill from non-users to low skill and some confident users Time spent using ICT is greater for children than parents
	Uses	Wide range of family technology activities for work, study, school, home administration and leisure that provide students with a variety of models of ICT use	Range of family technology activities for school and leisure Models of ICT use for leisure
	Support	Parents and siblings as technological contacts Immediate access to support Parents confident in supporting children	Siblings as technological contacts Technological contacts not always living in the family home Some delayed access to support Some parents unable to offer technological support

The average ICT literacy score for students from non-professional families was 56%. All students from non-professional families came from home fields that provided computer technologies for their children. The culture of technology use in these families

tended to centre on leisure-based tasks. There were no dedicated workspaces in these family homes, and students often had access to ICT in private bedroom spaces for long periods with little to no supervision. In terms of power, students and their siblings frequently held dominant positions in the home, setting the expectations for family use. For example, in Darcy's home her parents' lack of ICT skill and knowledge resulted in her older sister becoming the family ICT expert, providing guidance to all family members about safe and appropriate ICT practice and setting the tone for family use. This shift in power in relation to technology practice was a result of parents having low or no ICT skills. All students in non-professional families spent more time engaged with technologies each week than their parents did. In general, students from non-professional families had a narrower accumulation of technological social and cultural capital. The set of objectified practices and support they were able to access from their technological contacts (parents and siblings) were narrow and focused on leisure-based tasks or small periods of schoolwork.

In contrast, students from professional family backgrounds achieved an average ICT literacy score of 67%. Students from these homes valued technology for a broader range of practices; however, work and school tasks often assumed priority over informal leisure tasks, as demonstrated by the allocation of resources and by which tasks were given priority. Technology practice was in shared workspaces, and students had a clearer understanding of the types of tasks their family members regularly engaged in and discussed sharing and learning with parents and siblings. In terms of power, all parents in this group held the most dominant position within the home field, setting the tone and rules surrounding ICT use. Parents tended to be confident, regular users of technology and spent more time using it each week than their children. These students tended to have a greater stock of cultural and social capital, specifically in relation to the knowledge, skill and practices of their technological contacts. Thus they were objectified to a wider variety of practices and were able to access suitable support when needed.

Young people embody the explicit and implicit ICT practices within their homes, and this becomes part of how they understand and accept or reject the practices that are legitimised in social structures outside the home (North et al., 2008). The findings from this study suggest that, as with other educational outcomes, middle class students have

an advantage from the outset (Webb et al., 2002). This advantage is a result of a closer match between home and school in terms of ICT literacy practices. For example, in this study, students from professional families tended to be exposed to formal processes of ICT literacy within their home field, resulting in these students developing a stronger 'feel for the game' (Bourdieu, 1990, p. 82) when using technology at school. Alternatively, the set of technology practices experienced by students from non-professional backgrounds in their home fields was much narrower, with limited overlap with formal notions and processes of ICT literacy. Students from families whose cultures and funds of knowledge differ from those more relevant and valued in school education find it harder to integrate the school agenda with the cultures and practices of the home (Lewin et al., 2003). This mismatch between school and family habitus is reflective of the broader function of social reproduction that tends to constrain those with less capital, resulting in unequal access to institutional resources (Lareau, 1997), in this case ICT literacy.

2.3.2 Patterns of practice based on family background are nuanced and thus not a simple binary conceptualisation

There were a number of students whose ICT literacy and associated family practices did not reflect a binary conceptualization of technology practices as advantaged versus disadvantaged. The patterns became apparent in the analysis of three students' home ICT experiences and school-based ICT literacy using the theory of practice (Chapters Four, Six and Seven). The three examples are as follows.

Adam came from a professional family background and exhibited an ICT oriented habitus. His parents' low level of confidence translated into low stock of family technological capital and restricted access. These objective conditions further structured Adam's habitus and practice, resulting in the reproduction of a low level of ICT literacy. Adam's parents regularly outsourced family technology support, as they were unable to resolve home computer issues, and restricted his access to the computer and Internet, resulting in both decreased risk and opportunities. This example shows how coming from an advantaged background may not necessary lead to strong school-based ICT literacy.

Emma, who was being raised by a single mother from a non-professional (community carer) background, had a high level of ICT literacy. Analysis of Emma's practice uncovered the transformative nature of her mother's engagement with her daughter, conferring dominant cultural and social technological capital to support and guide technology practice, ensuring Emma's 'feel for the game' (Bourdieu, 1990, p. 82). It seems Emma's mother's involvement in her education benefited her academic achievement. While it is outside of the scope of this study to understand where Emma's mother acquired this disposition, it is clear that the time she spent supporting Emma's ICT practice influenced her daughter's stronger ICT literacy performance.

The ICT experiences of Lucas, also from a non-professional background, highlight the significant role of habitus in orienting an actor towards accessing additional technology experiences. For Lucas, whose parents' practices and support fit the general non-professional family habitus in terms of technology use, it was his self-interest in gaming and willingness to search and experiment that led to his further accumulation of capital and transformative practice via an additional online field. Within this field Lucas accessed a network of other game players for learning and support, structuring his habitus and in turn his practice. Lucas was the only student involved in creating and sharing outside of school, through creating video tutorials and sharing them on YouTube. These practices allowed Lucas to access additional social and cultural capital, which developed his ICT literacy beyond what his family could provide.

The individual ICT experiences of Adam, Emma and Lucas were not illustrative of the common patterns of ICT experience between parental occupation groups. Exploration of the ICT experiences of each of these students through a Bourdieuian lens allowed the complexities of their ICT practice to be uncovered, highlighting the significant structuring role of the objective conditions of the field(s) as well as detailing accounts of agency. For Adam and Emma, the different levels of their parents' accumulation of technological capital and habitus (skill, understanding and confidence) seemed to be significant influences on their ICT literacy. The rigid rules and monitoring imposed by Adam's parents in an attempt to reduce risks also worked to constrain his ICT practices and literacy. Similarly, findings from a UK study that explored parental strategies for mediating Internet use suggest that while restricting online interactions has benefits in

reducing risks, this restriction may well come at a cost by also reducing opportunities (Livingstone & Helsper, 2008). By contrast, Emma's shared ICT practices with her mother and her technology oriented habitus opened possibilities, leading to stronger ICT literacy. This finding was reflected by another UK study that explored the way parents view technology in relation to social class, detailing similar disruption of class-based patterns of ICT practice associated with parents' disposition, skill and confidence in supporting their children, both implicitly and explicitly. Such findings highlight the complexities of digital inequalities often overlooked when focusing on a simple class binary (Hollingworth et al., 2011).

Lucas's habitus oriented him to access additional fields, illustrating the role of agency mediated by his unsupervised private access (through which accessing a new online field became possible) in shaping ICT literacy practices, as well as the accumulation of additional technological capital and, in turn, a wider range of ICT literacy practices. Lucas's practice illustrated how his habitus was not merely determined or contained by this home field. His agency and ways of engaging with the field in turn modified his habitus and relationship with the field. Robinson (2014a) detailed similar accounts of agency driven by technology-oriented habitus in her investigation of highly motivated secondary students with access to different resources. The low-resourced students in her study demonstrated an orientation towards technology, actively exploiting resources and support outside of the home field to increase their accumulation of technological capital.

Overall, this study found that whilst patterns of practice and ICT literacy were associated with family background, a more detailed analysis revealed patterns of ICT literacy practice outside of a class-based binary. This highlights the messy realities of practice and challenges the deficit model of the digital divide as simply advantaged versus disadvantaged. While it is acknowledged that the small sample size of this study does not lend to generalisation, the in-depth cases served to illustrate the types of structures that may come to enable or constrain primary students' ICT literacy. Understanding students' ICT literacy practices in this way moves beyond a deficit view of the digital divide to draw attention to a more pragmatic research agenda that can provide a starting point from which to better address digital inequalities. Suggestions for such a research agenda are discussed below.

3 Implications for theory and practice

The aim of this study was to develop a more sophisticated understanding about primary students' ICT literacy by investigating their home ICT experiences alongside a school-based ICT literacy assessment. The previous section detailed key findings in relation to the study's research questions. The following section develops those findings into theoretical and practical implications.

3.1 ICT literacy is embedded in social and cultural context

ICT literacy is more complex than a set of discrete skills or processes. This study found that students' ICT literacy is embedded in a social context, it is a social practice bound by context (field), dispositions (habitus) and available support and resources (capital).

The ICT possibilities available to a young person are shaped by the ICT practices, culture, expectations and available resources of the field(s) in which they find themselves. For primary aged children these fields are usually limited to home and school (Hollingworth et al., 2011). At home children engage with ICT mostly for leisure and entertainment with educational activities allocated a smaller portion of time and much less enthusiasm (Cranmer, Selwyn, & Potter, 2009; Selwyn, 2002). They are exposed to a range of doxic practices framed by their family members' ICT dispositions and practice. While at school students engage with ICT and the processes of ICT literacy for educational purposes, their practice is generally structured, timetabled, monitored and blocked to meet educational outcomes imposed by the curriculum and class teacher. Importantly, the way in which children negotiate the differences between these two, at times competing, fields is easier for some than for others. A key finding of this study shows that those students who experience the processes of school-based ICT literacy within their home field through shared and objectified practices or implicit and explicit family education, come to school with a technological capital accumulation that is already valued, ensuring their 'feel for the game' (Bourdieu, 1990, p. 82). Those students who experience a narrower conception of ICT literacy for leisure and entertainment, through negotiation with siblings, extended family members or low-skilled parents, are less familiar with the formal processes of school-based ICT literacy. These students are at a disadvantage at the outset, as they come to school with a

technological capital accumulation that is not as easily converted, and as a result a do not have a 'feel for the game' when engaging in ICT-based learning experiences. Moreover, this study found that those children who experience a match of technology culture (doxic practices) between home and school demonstrate stronger ICT literacy than their peers who experience a mismatch of cultures.

Student performance on this studies ICT literacy task was associated with their family backgrounds as distinguished by parental occupation groups. In general, students from professional family backgrounds outscored their peers from non-professional backgrounds. This finding is similar to large-scale ICT assessments in the Australian school context (ACARA, 2012b), as well as reflecting the digital divide. In this way, the patterns in primary students' ICT literacy performance identified in this study are similar to patterns of broader social inequalities that tend to be reinforced by schooling. In Bourdieu's terms, this 'social reproduction' occurs as a result of the education system reproducing culture, in all its arbitrariness, by ignoring privilege and treating students as if they were all equal, when in fact they all begin with different opportunities based on their cultural endowment (Jenkins, 2002). In the case of ICT literacy, this reproduction can occur through teacher's lack of understanding of the variation in individual students' ICT practices.

Despite general patterns in ICT literacy according to socioeconomic status, some students can develop ICT literacy beyond what might be expected from their family circumstances. In this study, this is illustrated by the students whose ICT literacy, home ICT experiences and orientation towards ICT contrasted with broader class-based patterns. This key finding highlights the significant structuring role of parents in enabling or constraining their child's practice regardless of socioeconomic status, and the potential role of student habitus in orienting practice to access additional fields and transform knowledge and understanding. The ICT practices and literacy of these students challenge the simplistic notions of the digital divide as advantaged versus disadvantaged. Instead, these findings draw attention to ICT family backgrounds that work to either enable or constrain formal ICT literacy practices regardless of class group. Table 38 provides examples of enabling and constraining characteristics drawn from this study. The table is a revised version of Table 37 that focuses on family factors

or attributes rather than the class divide. As such, this table could serve as a list of indicators that can enable positive contexts for the development of ICT literacy.

Table 36. Family factors that enable and constrain formal ICT literacy

Family factors that *enable* formal ICT literacy	• Family members approach ICT practice with confidence and a self-interest in learning and seeking new ICT experiences • Family members have access to material resources that are located in shared or dedicated work/study spaces allowing for supervision and the sharing of practices • Family members are exposed to a technology culture that values ICT for a variety of purposes • Work and study tasks are considered of highest value and the division of resources are allocated accordingly • Parents hold positions of dominance framing family practice, rules and expectations for use • Technological contacts objectify a variety of practices and critical values around the integration of technology in society • Parents are confident, regular users of ICT, equipped to guide and support their children • Parents spend more time than children using ICT • Family education occurs through observation, informal discussion and support; these interactions tend to support formal processes of ICT literacy valued in the school field
Family factors that *constrain* formal ICT literacy	• Family members have access to material resources in private spaces, restricting shared practices and family learning experiences • Family members are exposed to a technology culture that values technology for only leisure-based activities • Technological contacts objectify a narrow set of practices and some technophobic values around the integration of technology in society • Parents range from no- to low-confidence users of ICT for a narrow set of practices • Parents are less equipped to guide and support technology use, resulting in students and siblings setting expectations and framing family practices or parents setting rigid, restrictive rules • Children spend more time than parents using ICT

Understanding ICT practices in this way serves as a more pragmatic approach to addressing inequalities within a school context. Such an approach moves from a deficit view of ICT practices based on social class to focus on ICT practices and resources that enable or constrain ICT literacy. This understanding allows educators to make meaningful links and design transformative learning experiences that assist children in better negotiating practices across home and school.

It is important to understand that while the professional families in this study generally had access to technological capitals that more closely aligned to the notion of ICT literacy, the different practices of the working class families were not assigned a deficit view, as it was not the focus of the researcher to view the data in a reductionist manner. Instead, the researcher believes that understanding how students come to use and understand technologies is crucial in assisting students to better negotiate differences across home and school fields.

3.2 Supporting ICT literacy by understanding ICT home experiences

One of the major aims of this study was to understand the differences in ICT experiences that students bring to school, to better understand inequalities in their ICT literacy. At a time when the popular discourse *still* considers children to be ubiquitously 'tech-savvy', regardless of the research evidence to suggest otherwise (Bennett, Maton & Kervin, 2008; Cranmer, Potter & Selwyn, 2009; Eynon & Geniets, 2015; Helsper & Eynon, 2010), a closer examination to develop a more sophisticated understanding of the digital divide in primary school students' ICT literacy achievement seemed critical as a starting point for addressing such inequalities in an Australian school context.

The transformative potential of Bourdieu's concepts of habitus, capital and field, illustrated by this empirical investigation, suggests possibilities for schools and teachers to improve ICT literacy outcomes for marginalised students. All students would benefit from teaching approaches that do not take for granted the social complexity of ICT literacy. The findings from this study reveal the role of formal primary schooling, as discussed by participants, as an important foundation for the acquisition of fundamental ICT skills. Similarly, other research supports this finding by contending that formal ICT learning plays an important role in supporting students' development of important ICT related skills and knowledge (Beckman et al., 2015; Pullen, 2015).

To avoid simply reproducing existing divides, the way these experiences are structured is critically important. Giroux (2003) suggests connecting critical learning to the experiences and histories that students bring to the classroom to engage the space of schooling as a site of possibility instead of deficiency. Strategies that move away from imposing the dominant culture on groups in such a way that they are experienced as

legitimate requires more conscious transformative teaching practices that broaden the types of cultural capital that are valued in the classroom, curricula related to students' worlds *and* work to expose the dominant culture (e.g. school-based ICT literacy) by making explicit the rules of that culture (Delphit, 1997; Jenkins, 2002; Mills, 2008). The following section suggests three key practices for primary education: authentic assessment, explicit ICT-skills-based programs and capital conferring activities.

3.2.1 Understanding students and their ways of knowing through authentic assessment of ICT literacy

Students' ICT literacy practices are embedded in social and cultural contexts, diverse and increase in cognitive complexity. Importantly, failing to acknowledge these differences in students' ICT skills and understanding will only reinforce inequalities in ICT literacy performance. For schools and teachers, this finding is perhaps most significant in the context of the integration of the new Australian Curriculum's ICT Capability and new Digital Technologies learning area (ACARA, 2012a, 2013). The introduction of this new curriculum content, which mandates that teachers teach *with* and *about* ICT, reinforces the critical need for authentic assessment as a starting point for the design of effective ICT learning experiences.

Too often educational technology enthusiasts advocate the integration of technologies with little regard for the students for whom such technology-supported learning experiences are to be designed (Selwyn, 2010). An understanding of ICT literacy as a complex social process must be the starting point for designing learning experiences that integrate technologies or seek to build ICT literacy skills. The most useful stance, therefore, is to strive to understand what knowledge and assumptions students bring to academic contexts from other aspects of their lives, and what that means for teaching and learning (Bennett & Maton, 2010). Such an approach moves beyond simply integrating informal digital practices and technologies into the classroom for technology's sake, to focus on gaining a deeper understanding of their students and their ways of knowing (McLean, 2010). Traditionally, understanding students and their ways of knowing comes from a cycle of assessment, teaching and learning. Assessing students' ICT literacy through the integration of a diagnostic tool, similar to the task used in this study, is a useful starting point for teachers to understand the different ways

in which their students engage with the processes of ICT literacy. An assessment tool of this type is critical to better support teachers in understanding the *real* variation that their students bring to practice and, in turn, better support students' ICT literacy development.

While an ICT assessment tool would provide teachers with data about the measureable ICT skills of their students, these test results capture only one measure of a student's ICT literacy. As the findings of this study illustrate, ICT literacy is complex and socially embedded. Thus, to better understand students' ICT literacy and associated practices, understanding students' ICT experiences outside of the school context seems important. Teachers could ascertain this information by designing learning experiences in which students share information about their family ICT practices. The questionnaire tool used in this study (Appendix E) is a useful starting point for this type of learning experience, which can be integrated into existing curricula. The questionnaire tool is flexible in design, as it allows for flexibility in learning design to best suit their students' needs and privacy, if required, when collecting personal information. An understanding of students' family experiences and practice, together with their ICT literacy, would allow teachers to better cater for the needs of all students to address and reduce the risk of reproducing inequalities.

3.2.2 Catering for all students by first building basic ICT literacy skills within a sociocultural context

Throughout this study, participants referred to the school librarian's computer skills program as an important source of ICT learning. However, as the diversity of ICT task results suggests, the ways in which students benefited from this program varied significantly. While qualitative case studies have shown that high school students consider ICT learning in primary school as fundamental in transforming their future practice (Beckman et al., 2014), the kinds of learning experiences that lead to this transformation are unclear. Yet, there is a body of evidence that points to the reproductive function of technology in the classroom (Selwyn, 2011). These findings suggest that regardless of intentions, without exposing the sociocultural nature of ICT, educational interventions serve only to benefit the already advantaged, through reinforcing existing ICT practices.

As primary school is the foundation for the acquisition of basic skills and competencies, it seems necessary that ICT learning experiences cater for all students by first building basic ICT literacy, before designing integrated learning experiences that require students to learn with ICT. This is reflected in Australia's educational goals, which assert that all young Australians will become successful learners who have the essential skills in literacy, numeracy and ICT as a foundation for success in all learning areas. In terms of ICT literacy, students require a range of basic skills and competencies before they can engage with technologies in critical and creative ways. This is particularly significant in the context of the new Australian curriculum's ICT general capability, which requires K-10 teachers to integrate ICT across all learning areas, so that students are 'learning with ICT' (ACARA, 2012a). To ensure that learners are able to 'learn with ICT', it seems critical that students are engaged in explicitly targeted ICT skills programs alongside the general ICT capability, to ensure all students have the opportunity to benefit from its introduction. To ensure that learning experiences are effective for all students rather than simply reinforcing digital inequalities, it is important that teachers are clear about what students need to learn and what indicates success in learning. This is most important for disadvantaged students, because without an understanding of the 'rules of the game' of schooling, they may not consciously make moves that permit them to win (Erstad, 2011). In this way, such instruction must be based on authentic assessment and tailored to suit the needs of each student. Additionally, skills programs should be situated in a broader social and cultural context as well as critically analysing the understanding and functions of ICT in society.

3.2.3 Capital conferring activities and partnering with parents

Along with teaching explicit ICT skills based programs within a sociocultural context, primary school teachers have the potential to confer technological capital through sustained daily interactions with students. As students illustrated, the teacher/student relationship can be fruitful in terms of conferring capital. Teachers can manipulate daily interactions to model technology practice in context with classroom tools, like the interactive whiteboard, and through the discussion of ICT skills, processes, critical thinking and troubleshooting. This type of modelled practice should be should be informed by a cycle of teaching, learning and assessment so that practice is meaningful and connected to students' ICT literacy and experience. In short, without prerequisite

forms of technological capital, the ability to demonstrate a particular ICT literate practice may well be of limited value to the individual (Carrington & Luke, 1997). In this way, modelled ICT practice to confer technological capital can be targeted to build students' existing accumulation of capital, while explicitly uncovering the rules of the game.

In addition, following pedagogical methods of traditional literacy, educators who extend beyond the classroom to involve parents could further support capital conferring activities (Lee & Bowen, 2006). Such an approach would aim to build parents' technological capital through the provision of both information and skills, which they may in turn share with their children with the aim of building connections across home and school (Coleman, 1988). For example, teachers could facilitate after school ICT clubs for both students and parents to develop ICT literacy skills. Such a space provides an authentic opportunity for families to share formal ICT literacy practices. Teachers could also extend on this shared practice to provide useful information about the ways parents may enable school-based ICT literacy at home, as previously outlined in Table 38.

3.3 Applying the theory of practice to primary students' ICT practices

This research applied Bourdieu's theory of practice to develop a methodological and analytical framework for understanding primary students' ICT practices, drawing first on the conceptualisation of technological capital to understand the resources available to students (Selwyn, 2004). This was followed by a focus on the objective conditions of the fields, in which students acquire and deploy such resources, and the role of habitus (practices, preferences and orientation towards ICT) in shaping practice. A discussion of the strengths and potential for future application of the framework to investigate ICT practices is detailed in section 3.3.1.below. This is followed by a discussion of the criticisms of the theoretical constructs in context of the conceptual challenges faced by the researchers throughout the research period in section 3.3.2.

3.3.1 Framework to investigate ICT practices

This study applied the constructs of habitus, field and capital together to uncover new details of students' ICT experiences together with their school-based ICT literacy. This empirical application allowed the researcher to uncover both objective structures and generative practices of students and parents that worked to enable or constrain students' school-based ICT literacy practices. Additionally, such an application permitted further refinement of each of the theoretical constructs, specifically in their application to technology practices. Table 39 illustrates the researcher's refined addition of field (home and school) and habitus together with technological capital (Selwyn, 2004) to characterise the theory of practice as it was applied to ICT literacy practices. This guiding framework is a useful empirical tool for future research exploring students' ICT experiences that pays attention to the complex sociocultural contexts within which students operate.

Table 37. Refined theoretical framework

Home (field)	School (field)	Technological capital*		Student habitus
Home environment including resources, availability and location of resources, culture of technology use (doxa), contacts, rules surrounding use and position within the field *Family* Positions within the field Dispositions and experience of family members (habitus)	School environment including resources available and location of resources, culture of technology use (doxa), contacts, interactions and rules surrounding use, position of family in the field, position of child within the field *Teacher(s)* Position of teacher within the field Teacher's dispositions and experience (habitus)	Economic Capital	Material resourcing of students' home and school environments including quality and quantity of equipment and capacity for maintenance and upgrade of equipment	Personal disposition and orientation toward the use of or experiences with technology (practices and preferences)
		Cultural	*Embodied* Self-interest in investing time into self-improvement of ICT skills (e.g. experimenting, self-discovery, play-based learning episodes). Active participation in ICT education, both formal (within school) and informal (outside of school) *Objectified* Socialisation into technology use and 'techno-culture' via techno-cultural goods (e.g. exposure to ICT via magazines, books and YouTube), family, peers, teachers and online communities and networks *Institutionalised* Formal school ICT learning (e.g. integrated into regular class lessons or specialised classes)	
		Social	Students' network of 'technological contacts' and support. These can be face-to-face (including family, friends, neighbours, tutors, and other 'significant others'; membership of groups/organisations) or remote (online help facilities, commercial help lines, online communities)	

(*Adapted from Selwyn, 2004)

A technology-focused conceptualisation of theory of practice, such as this one, can assist researchers at a conceptual, methodological and analytical level: conceptually, to define the research object; methodologically, in the design of appropriate data collection

tools and strategies; and analytically, guiding analysis through coding and a detailed discussion of ICT practices. This type of application is what Bourdieu originally intended, to better design and conduct work of socially reflexive nature (Reay, 2004; Selwyn, 2014).

3.3.2 Transformative potential

This study employed Bourdieu's thinking tools empirically to better understand students' ICT literacy and associated practices. In doing so, the researcher considered discussion and criticism of the application of these theoretical constructs to educational research. The goal of Bourdieu's theory of practice is to uncover structures and mechanisms that tend to ensure reproduction or transformation (Bourdieu, 1996). However, his work has been disputed for being deterministic in nature. Critics have argued that the theory of practice, developed in the context of the French education system, is limited in its general applicability, and most significantly fails to account for social mobility (Jenkins, 2002). In contrast, it is argued that such criticism fails to acknowledge both the structured and generative nature of habitus in "accounting for agency in a constrained world" (Harker & May, 1993, p. 177).

Further, Bourdieu's analyses of the French education system introduced the notion of symbolic violence, through which culture is imposed upon groups or classes in such a way that it is experienced as legitimate (Schubert, 2012). Teachers act to impose such symbolic violence unknowingly through pedagogic action to reproduce the dominant culture while also reproducing the power relations that underwrite its own operation (Webb et al., 2002). Such notions have challenged researchers' thinking due to their deterministic nature; however, identifying the misrecognition with which teachers often act has allowed for the extension of agency to teachers' practices and the consideration of critical pedagogies. Although education tends to reproduce social inequalities through misrecognition and symbolic violence, critical pedagogies can provide opportunities for teachers to exercise agency to transform students' practices through broadening the types of cultural capital that are valued in the classroom, relating curricula to students' worlds and explicitly uncovering the rules of the dominant culture.

In the application of the theory of practice in this study, the researcher considered the above challenges and criticisms, particularly in relation to the concepts of social reproduction and symbolic violence. Given that a major aim of this investigation was to better inform teaching practice in a way that might begin to address digital inequalities, the notion of social reproduction may seem only deterministic, with little room for transformation and resistance. However, the data itself allowed the researcher to resolve this conflict by illustrating the complexity of interactions between social space/field and the generative capacity of students' and parents' habitus to resist objective structures and transform practices. For example, Emma's performance on the ICT literacy task was higher than expected given her non-professional family background. A Bourdieuian analysis of Emma's ICT literacy performance and her home experiences revealed the transformative role of her mother's involvement in Emma's educational ICT practices. Her mother's investment in Emma's education worked to transform her ICT literacy practice beyond what would typically be expected, given her non-professional family background. Parental involvement in children's education has been associated with academic achievement (Coleman, 1988; Lee & Bowen, 2006). In contrast, Lucas exhibited the generative capacity of habitus in accessing an additional field, outside of home and school, in the form of an online gaming community. This field afforded Lucas additional technological capital, which translated into ICT practices for creating and sharing instructional gaming tutorials online. This critical and creative practice was different to his peers from all backgrounds and not typical for a young person from a non-professional family. These examples of agency in a constrained reality served as a turning point in the researcher's thinking.

Furthermore, the theoretical work in this study drew the researchers attention to the notion of symbolic violence, which details how teachers, through misrecognition and pedagogic work, tend to reproduce the values of the dominant culture (Grenfell, 2008). Yet, in the same way as the students and their parents in this case study, teachers also have the capacity to demonstrate agency upon becoming conscious of the arbitrary nature of social domination and their own pedagogic action (Schubert, 2012). The application of the theory of practice to students' ICT literacy practice provides a framework uncovering hidden structures that work to entrench digital inequalities. An understanding of the hidden structures that may come to enable or constrain ICT literacy can allow teachers to consciously act to transform the field rather than

unconsciously preserving it. This consciousness provides a discourse that can allow teachers, and accordingly students, the power 'to redefine the game and the moves which permit one to win in it' (Bourdieu, 1988, p. 172).

In sum, this study has made a theoretical contribution by empirically applying Bourdieu's theory of practice to primary students' ICT literacy practices, and further refining this framework for future research investigating students' ICT practice. While the qualitative application of this framework has provided detailed understanding of ICT experiences and corresponding ICT literacy as a social and cultural process, what is needed now is a broader application of the framework to larger, more complete data sets, including parents and teachers, to better understand the fields in which students practice.

4 Limitations

Whilst this study has enabled a detailed understanding of primary students' ICT literacy by investigating their home ICT experiences alongside a school-based ICT literacy assessment, five limitations need to be acknowledged: the self-reported nature of the data, the specific design of the ICT literacy task, the power relations between the researcher and participants, the classification of families according to parental occupation groups and the overall generalisability of findings.

4.1 Self-reported nature of data

Data reflecting students' home ICT practices was self-reported, collected from a questionnaire about their home ICT experiences, family technology interviews conducted by students and shared in a class blog and, for six students (embedded participants), semi-structured reflective interviews. As technology expertise and freedom of use, particularly in relation to social media and gaming, was a much-valued capital within social fabric of the Year 6 student body, there was some concern that students may have embellished details of their practice in an attempt to gain recognition from their peers. To ensure the credibility of self-reported student data, the questionnaire and family technology blog posts were completed at home with family

members as a form of member checking. Although it is acknowledged that parents are also capable of providing socially desirable responses, the combination of member checking together with triangulation of multiple data sources, was built into the design to assist in overcoming any discrepant data that students may have provided.

4.2 ICT literacy task as one assessment of school-based ICT literacy

The study explored ICT literacy in terms of the school-based assessment task, and investigated students' ICT experiences at home and at school in the context of their explanation of the task and background questionnaire data, and not as a comprehensive survey of all ICT experiences across all fields in their lives. Given the specific nature of the ICT literacy task as an assessment of performance, this study only captured one measurement of the six processes of ICT literacy, as defined by (MCEETYA, 2007), for one moment in time. Although similar measurements are used in Australian schools as part of the National Assessment of ICT literacy, rather than being definitive of practice this data should be considered as one school-based measure, bound by time and the possibilities of the task itself within the school field. In terms of the six embedded participants, ICT task data was used together with data from semi-structured reflective interviews to glean a more considered and holistic understanding of students' ICT literacy, in context of their ICT experiences. This rich data, from embedded participants, allowed the researcher to engage in detailed analysis within, between and across units, to move beyond a simple test score to understand how and why such practices are structured and generated.

4.3 Power relation between the researcher and participants

A Year 6 class within a local primary school was purposively selected due to the mix of family backgrounds and the researcher's working relationship with the school. Purposive sampling is based on the supposition that the researcher wants to uncover, comprehend and gain insight, and thus must select a sample from which the most can be learned (Merriam, 1998, p. 61). The class was selected as the case due to the mix of family backgrounds anecdotally noted by the main class teacher, and the researcher's existing relationship with the main class teacher and class, as she taught the class two days a week in a job-share position with the main class teacher. As with any field,

actors are subject to power relations of dominance and subordination. In the context of this study, the researcher held a position of dominance, which may have influenced the type of information that the students did or did not share. This power dynamic occurred as a result of adult/child and teacher/student dynamics between the researcher and students. The following actions were taken to shift these power relation dynamics between researcher and participants: scheduling data collection outside of part-time teaching commitment, wearing casual clothing, reinforcing the focus on collecting student views and experiences by inviting the participants to assist the researcher in understanding their perspectives (Kellett & Ding, 2004)

4.4 Classification of families

Occupations of students' parents were initially classified according to the Australian Standard Classification of Occupations (ASCO) schema (Castles, 1986). The single level indicator of highest status occupation within the home based on ASCO was used to, first, determine occupation categories and, second, to separate family background groups into professional and non-professional occupations. The distinction made between these two groups was based on broader socioeconomic groupings. As a result of viewing families within these two broad categories, the subtleties of ICT practices within individual occupation categories may have been overlooked.

4.5 Generalisability of findings

The findings of the case study present a detailed picture of the home ICT experiences and associated ICT literacy practices of 25 students from one Year 6 class, including six embedded participants. While this method was powerful in providing rich detail that provided insights into the complexities of practice from participants' perspectives, care must be taken not to draw generalisations from this study to all young people. Instead, this study has highlighted the nuanced complexity of the ICT experiences and school-based literacy that needs to be considered when undertaking further research. More studies of this type are needed to build rich, nuanced evidence from which themes may be identified and generalisations can begin to be made.

5 Further research

This study has highlighted the need for further research in the following areas:

5.1 Broader application of the study's research design

The case study investigated one class of Year 6 students in a regional public school in NSW, Australia. Focusing on one class allowed for in-depth qualitative understanding of this particular context. However, as this study has found, students' ICT literacy is socially embedded and inextricably linked to the fields in which students operate. The application of the study design to different cases representing a range of backgrounds, locations and ages would provide a deeper understanding of students' ICT practices and associated literacy to better support more effective teaching and learning practices across a range of contexts. A longitudinal study that captures the same data, a measure of ICT literacy together with details of ICT experience, from students at each stage of education, including primary, secondary and tertiary levels, is of particular interest to the researcher. The aim of this type of study is to understand how students' ICT literacy changes over time, given access to a number of increased of fields and social practices as well as the demands of different educational institutions.

5.2 Application of the theoretical framework to family members

The study's key findings highlight the significant role of parents and siblings as technological contacts in structuring students' ICT practices and associated literacy. While data about students' home ICT experiences was collected from students through questionnaires and blogging activities that were member checked by parents, no data was directly obtained from parents. Further research is required that applies the study's theoretical framework to students' home fields to collect data from all family members. Parents might have an alternate perspective that adds to an understanding of the broader social and cultural processes that shape and impact the life of young people (France, 2004). This type of research would serve to extend expand upon the existing project and allow a better understanding of the resources and knowledge that parents and siblings use as they offer varying levels of support and possibilities.

Additionally, a focus on other family members who do not live in the family home but still support students' ICT practices, including blended and separated families, is of

interest to the researcher, as is the inclusion of other non-school sites in which children engage in ICT practices, including the homes of friends and families and church, community and sporting groups, as well as the technological contacts within these fields.

5.3 Application of the theoretical framework to the school field

While this study sought to understand the relationship between students' home ICT experiences on school-based ICT literacy, the impact of school and class practices on school-based ICT literacy was not an area of investigation. However, students did refer to teachers and the library ICT skills program as important sources of learning. Further research investigating the school field, actors (teachers) and practices enacted within the field in relationship to students' ICT habitus would be beneficial in providing a more nuanced understanding of the role of schools in developing ICT literacy. Such research could focus on examining how school and home environments might clash or be mutually exclusive or understanding teachers' ICT-based values and dispositions together with their understanding of students' ICT literacy and approaches to ICT learning and integration within the classroom. This agenda is of particular significance in the Australian context, given the introduction of the Australian Curriculum's ICT General Capability and intended introduction of a new Digital Technologies learning area.

5.4 Evaluation research of ICT skills programs, digital pedagogies and diagnostic assessment

As a result of this study's key findings, the researcher made several pedagogical suggestions to better support all students' ICT skills development from a transformative perspective. These suggestions included a number of teaching strategies that do not neglect the social complexity involved in the development of ICT literacy skills. Importantly, with the rollout of the Australian Curriculum and the new ICT capability, an understanding of such programs' capacity to bridge or simply reinforce inequalities seems critical. In this context, further research investigating the impact of such programs and, importantly, the role of the teacher in interpreting, implementing and acting as agents of socialisation is significant.

In addition, the application of the ICT literacy task as a diagnostic tool to inform teachers' ICT integration is a potential area of further investigation. Such a research agenda would focus on the ways in which this knowledge can inform teachers' future ICT practice and integration. Pre-test interviews, diagnostic test analysis and post-test interviews may be an appropriate data collection strategy for ascertaining how such knowledge affects the ways teachers approach the integration of ICT in their classroom.

6 Conclusion

The purpose of this study was to gain a deeper understanding of the 'digital divide' by examining the ways in which differences in primary school students' ICT experiences at home shape their school-based ICT literacy practices. A qualitative embedded case study approach was used to collect data across three phases from one class of 25 Year 6 participants. This data collection strategy was integrated into the case class' regular program. Data consisted of background questionnaires, a digitally recorded ICT literacy task, six semi-structured reflective interviews post-ICT task and family blogging activities.

The key findings of the study are summarised as follows:

- Students are far from a homogenous group. Their digitally captured ICT literacy was varied and complex, and patterns of performance were observed across the six processes of ICT literacy. While some students exhibited some or all of the characteristics of the 'digital native' (Prensky, 2001a), including strong ICT literacy practices, strategies and orientation towards using ICT, others did not.
- Across the processes of ICT literacy, students performed the strongest when completing lower-level tasks such as *accessing* and *managing information*. The weakest performance was captured when completing higher order critical and creative thinking tasks such as *evaluating information*, *developing new understandings* and *communicating with others*. Students who performed poorly in low-level tasks were limited in their ability to perform critical thinking tasks. However, functional skills did not necessarily ensure higher order critical skills. All students performed better

when provided with clear guidelines and more structure, which is typical for the age group of the participants.

- ICT literacy is more complex than a set of skills or processes. Importantly, ICT literacy is embedded in a social and cultural context: it is a social practice bound by context (field), dispositions (habitus) and available support and resources (capital).
- Family members and home environment play a critical role in structuring students' current and future practice. Students in this study came from a variety of home fields and drew on varying sets of technological capital, which influenced their habitus and, accordingly, how they accessed and engaged with ICT, and in turn their ICT literacy.
- ICT literacy performance was influenced by family background. Most students from professional family backgrounds outscored their peers from non-professional families. However, several students did not fit this profile.
- The in-depth investigation of the ICT literacy practices of six embedded participants revealed the ways in which participants and their families transformed, restricted and reproduced ICT literacy practices associated with socioeconomic status. In general, students from professional families outscored their peers from non-professional families. Yet, the six embedded participants did not neatly fit this 'advantaged versus disadvantaged' model of the digital divide. A number of students and parents demonstrated agency, through focused interest or indifference, in generating ICT practice, which was not always typical of their family background groups.
- The ICT experiences of students who demonstrated stronger school-based ICT literacy include a self-interest and motivation towards engagement with ICT for self-discovery learning, exposure to a broad set of ICT practices (including those valued in a school context), access to ICT in shared locations (encouraging shared ICT practices and discussion) and access to skilled contacts within the family home who are equipped to guide, monitor and support family ICT practices. In contrast the ICT experiences of students who demonstrated lower levels of school-based ICT literacy include indifference towards ICT use, exposure to a limited set of ICT practices generally for leisure, access to ICT in private spaces (limiting shared

dialogue about ICT practice) and access to lower skilled contacts within the family home, who are not always parents/guardians. In these families, parents/guardians are not always equipped to guide, support and monitor family ICT practices, resulting in either restriction of ICT practices or children shaping family culture and rules for ICT practice.

These findings are a significant addition to the large-scale quantitative research in Australia and across the OECD documenting the digital divide. They enrich existing data with detailed descriptions from the ground up about the type of structures, experiences and exchanges that work to either enable or constrain school-based ICT literacy, instead of adopting a simplistic, 'advantaged versus disadvantaged', deficit view of ICT practices. The findings have practical implications for the design of effective learning experiences, particularly in the context of the rollout of the Australian National Curriculum ICT General Capability and Digital Technologies learning area, to ensure that learning experiences work to promote digital inclusion rather than reinforce differences. Further research is now required to better understand the complexity of children's and young people's ICT literacy experiences across a range of contexts, paying particular attention to the ways such experiences shape ICT practices and possibilities.

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APPENDICES

Appendix A – Statement of contribution of others

Statement of contribution of others

Four of the chapters presented in this thesis are 'in preparation' journal manuscripts. Details of each paper including thesis chapter, title, target journal, authorship and a signed statement of contribution have been provided below.

Chapter Two	***Literature Review***
Title	ICT literacy and the digital divide: A systematic review of the research investigating school students' ICT literacy and associated practices.
Format	Manuscript prepared for submission
Target	Educational Research Review
Journal	JCR 2014 Impact Factor = 2.452; ranked 11/224 (Education & Educational Research)
Authorship	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)

Chapter Four	***Results***
Title	Technology in my life: Understanding differences in primary students' ICT experiences
Format	Manuscript prepared for submission
Target	Learning, Media and Technology
Journal	JCR 2014 Impact Factor = 0.759; ranked 107/224 (Education & Educational Research)
Authorship	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)

Chapter Five	***Results***
Title	Capturing primary students' ICT literacy
Format	Manuscript prepared for submission
Target	Australian Journal of Education
Journal	JCR 2014 Impact Factor = 0.216; ranked 209/224 (Education & Educational Research)
Authorship	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)

Chapter Six	***Results***
Title	Well not all kids are experts with technology: Listening to primary students talk about their ICT literacy practices
Format	Manuscript prepared for submission
Target Journal	Computers and Education JCR 2014 Impact Factor = 2.556; ranked 8/224 (Education & Educational Research)
Authorship	Tiffani Apps (90%), Shirley Agostinho (5%), Sue Bennett (5%)

The primary contribution in each of the above 'in preparation' journal manuscripts has been undertaken by the PhD candidate, Tiffani Apps, and the contribution of co-authors, Professor Sue Bennett and Doctor Shirley Agostinho, was primarily through the provision of feedback and review.

....	....	....
Tiffani Apps	Professor Sue Bennett	Doctor Shirley Agostinho
PhD Candidate	Research supervisor & Co-author	Research supervisor & Co-author

....

Doctor Sarah O'Shea

Head of Postgraduate Studies

August, 2015

Appendix B – UOW ethics approval

University of Wollongong

INITIAL APPLICATION APPROVAL
In reply please quote: HE11/115
Further Enquiries Phone: 4221 4457
JML:SH

3 June 2011

Ms Tiffani Cameron
Faculty of Education
University of Wollongong

Dear Ms Cameron,

Thank you for your response dated 1 June 2011 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:	HE11/115
SERAP No:	2011066
Project Title:	ICT literacy and the second digital divide: Understanding students' experiences with technology
Researchers:	Ms Tiffani Cameron, Dr Susan Bennett, Dr Shirley Agostinho
Approval Date:	2 June 2011
Expiry Date:	1 June 2012

The University of Wollongong/Illawarra and Shoalhaven Local Health Network 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. As evidence of continuing compliance, the Human Research Ethics Committee 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.

You are also required to complete monitoring reports annually and at the end of your project. These reports are sent out approximately 6 weeks prior to the date your ethics approval expires. The reports must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

Yours sincerely

A/Professor Garry Hoban
Chair, Social Sciences
Human Research Ethics Committee

Cc: Dr Susan Bennett - Faculty of Education
Dr Shirley Agostinho - Faculty of Education

Research Services Office University of Wollongong NSW 2522 Australia
Telephone: +61 2 4221 3386 **Facsimile:** +61 2 4221 4338
research_services@uow.edu.au www.uow.edu.au/research
CRICOS Provider No: 00102E

Appendix C – DET SERAP ethics approval

NSW GOVERNMENT | Education & Communities

Ms Tiffani Cameron
Faculty of Education
University of Wollongong
WOLLONGONG NSW 2522

DOC11/125480
SERAP number: 2011066

Dear Ms Cameron

I refer to your application to conduct a research project in NSW government schools entitled *ICT Literacy and the Second Digital Divide: Understanding Students' Experiences with Technology.* I am pleased to inform you that your application has been approved.

You may now contact the Principals of the schools in your application to seek their participation. Your approval will remain valid until 13 July 2012.

You should include a copy of this letter with the documents you send to Keiraville and Mount Ousley Public Schools and Corrimal and Warilla High Schools. I draw your attention to the following requirements for all researchers in NSW 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 data 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 email a scanned copy of your report to the Manager, Schooling Research at robert.stevens@det.nsw.edu.au and myself at amanda.atkinson@det.nsw.edu.au.

Yours sincerely

Amanda Atkinson
Professional Support Officer
13 July 2011

Illawarra and South East Region – Delivering Results, Creating Success, Building Relationships
5 Rowland Avenue, PO Box 1228, Wollongong, NSW, 2500
T 4222 2929 F 4222 2963

Appendix D – Information & Consent - Parents, Students & Class teacher

University of Wollongong

PARENT/CAREGIVER INFORMATION SHEET

Research Project: ICT literacy and the second digital divide: Understanding students' experiences with technology

Your child is invited to take part in a study that is being conducted by Tiffani Cameron. It is part of a Doctor of Philosophy study, being supervised by Associate Professor Sue Bennett and Doctor Shirley Agostinho. We are asking you if it is okay for your child to take part in this project. We are trying to better understand the achievement divide in students' ICT literacy skills as reported in Australia's National Assessment Program for ICT literacy (MCEECYDA, 2007 & 2010)

The information from the study will be used to provide valuable descriptions about the differences in students' experiences with technology and the factors influencing their achievement with ICTs outside of the school environment. Understanding these differences will assist schools and educators in addressing achievement divide in order to better develop young people as successful learners, creative individuals and informed 21st century citizens. This study will make a contribution to the emerging field of knowledge as well as assisting schools and teachers to address differences in ICT literacy levels and more effectively integrate technology into the classroom. 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.

We will ask your child to complete a questionnaire and possibly participate in a guided recall interview about their ICT skills that will take them about 45 minutes in total. Otherwise participation in this study involves an ICT proficiency task and class blogging activities, which will be integrated into your child's normal classroom activities.

Data collection will occur within the school across 8 weekly visits during regular class time in Term 3, 2011. The research will not affect the regular activities of your child's classroom and the principal researcher who is an experienced classroom teacher will collect all data.

Participation is voluntary and your child will only take part if both you and your child agree. If you do decide not to take part, it will not affect your child's results or progress at school, if you or your child change your mind about taking part, even after the study has started, just contact the researchers or the school and any information already collected about your child will be 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. Data collected about your child will be stored securely in the Faculty of Education for at least five years to conform with the University's Code of Practice-Research and the joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997) and then destroyed.

You should also be aware that if your child takes part in this study information collected through a short questionnaire, would be sent home to be checked by you for accuracy. The ICT proficiency task and student blog activities that your child will complete as part of their regular class activities will be digitally captured and collected for analysis. Guided recall interviews will be conducted with three to six students running for 30min each. Each interview will be

conducted by the principal researcher within the school grounds. Your child may be asked to participate in a guided recall interview based on their results in the earlier ICT proficiency task. The interview will involve participating students guiding the researcher through their digitally captured ICT proficiency task to explain and rationalise their ICT use. The interview will be audio taped and later transcribed for accuracy. Audio recordings and transcriptions will be securely stored along with other data in the researchers office and held for a period of five years after which they will be destroyed. Only the researchers will be able to access the 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, Tiffani Cameron 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.

Researchers		
Tiffani Cameron Faculty of Education University of Wollongong Ph: 4221 5249 email: tiffani@uow.edu.au	Assoc Prof. Sue Bennett Faculty of Education University of Wollongong 4221 5738 email: sbennett@uow.edu.au	Shirley Agostinho Faculty of Education University of Wollongong 4221 5512 email: shirleya@uow.edu.au

University of Wollongong

PARENT/CAREGIVER CONSENT FORM

Research Project: ICT literacy and the second digital divide: Understanding students' experiences with technology

I (print name) ……………………………………………………………………………………………
give consent to the participation of my child (print name) ………………………………………….
in the research project described below.

TITLE OF THE PROJECT: ICT literacy and the second digital divide: Understanding students' experiences with technology.

CHIEF RESEARCHER: Tiffani Cameron, (02) 4221 5249, tiffani@uow.edu.au

CO-RESEARCHERS: Associate Professor Sue Bennett, 4221 5738, sbennett@uow.edu.au
Doctor Shirley Agostinho, 4221 5512, shirleya@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 Parent 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
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 r relationship with the school and they are free to withdraw their participation at any time.
5. I understand that my child's involvement ids 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 audio recordings will be made as part of this study. These recordings will take place with selected students during:
    a. guided recall interviews to be conducted at school during regular school hours in Term 3, 2011.

    Please cross out any activity that you do not wish your child to participate in.

Signed………………………………………………………………..

Name…………………………………………………………………

Date…………………………………………………………………..

If you have any enquires 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.

University of Wollongong

STUDENT INFORMATION SHEET

Research Project: ICT literacy and the second digital divide: Understanding students' experiences with technology

Dear Student

I am trying to find out about the different ways students experience and use technology and how factors outside of school in your home and family might influence students' experiences.

To do this I would like to come into your classroom to speak to you about technology and see how you use it.

While in your classroom I will ask you to fill in a questionnaire, take it home to check with your parents and then bring it back to school for me to collect.

I would also like you to participate in an ICT literacy task on the computer, which I will digitally capture, so I can look at how you are all using technology.

After this task I would like ask some students to participate in an interview, where we will watch parts of your captured task and you will talk to me about what you where doing and why you chose to do it in that way. I will record these ideas on a tape recorder to help me remember what you say

When I have finished collecting this information I would like to show you how to use a blog and ask you to complete four entries all about how you, your family and friends use technology. I will collect this information as well because I am interested in how you use technology.

I will visit your class up to eight times this year.

I will not use your name when talking or writing about you what I learn from you.

You don't have to be a part of this study if you don't want to.

You can tell your teacher or me at anytime if you change your mind.

Please talk to your parents or guardians about this note.

Please fill out the consent form together and bring it back to your teacher.

Please ask if you have any questions.

Thank you
Miss Cameron

University of Wollongong

STUDENT INFORMATION SHEET

Research Project: ICT literacy and the second digital divide: Understanding students' experiences with technology

I have been told about the *Understanding students' experiences with technology* research project in class.

I understand that a researcher will come into my classroom to see how we use technology.

I understand that the researcher will ask me to fill in a questionnaire about how I use technology.

I understand that the research will digitally capture my in class ICT literacy task to get information about how I use technology

I understand that the researcher might ask me to participate in a tape recorded interview during which I will tell her about what I was thinking while doing my ICT proficiency task.

I understand that the researcher will teach blogging lessons in my class time and I will blog about my experiences with technology. I understand the researcher will collect samples of this work.

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…………………………………………………………………..

TODAYS DATE……………………………………………………………………….

TEACHER INFORMATION SHEET

Research Project: ICT literacy and the second digital divide: Understanding students' experiences with technology

Dear Teacher,

My name is Tiffani Cameron 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 Doctor Shirley Agostinho. The broad aim of the research project is to gain a better understanding the achievement divide in students' ICT literacy skills as reported in Australia's National Assessment Program for ICT literacy (MCEECYDA, 2007 & 2010)

Information from the study will be used to provide valuable descriptions about the differences in students' experiences with technology and the factors influencing their achievement with ICTs outside of the school environment. Understanding these differences will assist schools and educators in addressing achievement divide in order to better develop young people as successful learners, creative individuals and informed 21st century citizens. This study will make a contribution to the emerging field of knowledge as well as assisting schools and teachers to more effectively integrate technology into the classroom. 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 integrate an ICT proficiency task and class blogging activities into their regular classroom activities during Term 3, 2011. Both the ICT proficiency task and blogging activities will be directly linked to NSW BOS outcomes and your chosen class theme or unit, as negotiated between the researcher and class teacher. The chief researcher will conduct the ICT proficiency task and blogging activities with students in a team teaching situation with participating teachers. However, all organisation and administration will be the responsibility of the researcher.

With your permission and the permission of the students in your class and their parents, we will ask your students to complete a short questionnaire that they will be asked to take home for their parents to check. Guided recall interviews will be conducted with three to four students from your class running for 30min each. Each interview will be conducted by the chief researcher within the school grounds. Students will be selected to participate in the guided recall interview based on their results in the earlier ICT proficiency task. The interview will involve participating students guiding the researcher through their digitally captured ICT proficiency task to explain and rationalize their ICT use. The interview will be audio taped and later transcribed for accuracy. Otherwise student participation in this study involves the ICT proficiency task and class blogging activities, which will be integrated into your normal classroom activities. Data collection will occur within the school, in your classroom and school computer lab (if available) across 6-8 weekly visits during regular class time in Term 3, 2011.

Your participation in this study is voluntary and you may withdraw at anytime by contacting Tiffani Cameron, 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 with 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, Tiffani Cameron 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		
Tiffani Cameron Faculty of Education University of Wollongong Ph: 4221 5249 email: tiffani@uow.edu.au	Assoc Prof. Sue Bennett Faculty of Education University of Wollongong 4221 5738 email: sbennett@uow.edu.au	Shirley Agostinho Faculty of Education University of Wollongong 4221 5512 email: shirleya@uow.edu.au

TEACHER CONSENT FORM

Research Project: ICT literacy and the second digital divide: Understanding students' experiences with technology

I have been given information about *ICT literacy and the second digital divide: Understanding students' experiences with technology* and discussed the research project with the researchers.

I understand that if I consent to participate in this project, I will be asked to

- Integrate an ICT proficiency task into my Term 3 teaching program to be administered by the researcher.
- Integrate blogging activities into my Term 3 teaching program to be team taught by the researcher and myself
- Allow the researcher to administer and collect student questionnaires
- Allow the researcher to conduct scheduled, audio taped guided recall interviews with selected students
- Allow the researcher to digitally capture students ICT proficiency tasks
- Allow the researcher to collect blogging activity work samples of students participating in the study.

I have been advised of the potential risks and burdens associated with this research, which include the time required for the integration of ICT proficiency tasks and blogging activities in my Term 3 program along with the time required of students to participate in interviews. I have had the opportunity to ask the researchers any questions I may have about the research and my participation.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at anytime. My refusal to participate or withdrawal of consent will no affect my relationship with my primary school or the University of Wollongong.

If I have any enquiries about the research, I can contact the researchers according to the details provided in the information sheet. If I have any 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.

By signing below I am indicating my consent to participate in the research entitled *ICT literacy and the second digital divide: Understanding students' experiences with technology,* as it has been described to me in the information sheet and in discussion with the researchers. 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.

Signed……………………………………………………………..

Name………………………………………………………………

Date………………………………………………………………..

Appendix E – Background questionnaire

Technology in your life

How do you use technology at home?

ME

My age: ___________

I am a (circle):

Boy

Girl

Do you like using computers and the Internet? Can you tell us why?

____

____

____

____

What is your favourite activity using computers and the Internet?

____

____

____

What is your least favourite?

____

____

____

Who taught you to use the computer and internet?

____

____

____

Who do you ask to help you if you get stuck?

____

____

____

____

SCORE CARD

If you could give yourself a score out of five for how good you are at using computers and technology with one being not so good and five being excellent, what would you rate yourself?

(not so good) 1 2 3 4 5 (excellent)

My Technology Timetable

List the things you do on the computer and with the internet including any games you might play.

Technology	Location	Purpose	Amount of time per week
Computer	*Lounge room*	*Play games on internet*	*4 hours*

BTW *If you run out of room get just ask for another sheet to fit it all in!*

Technology in your Life
How do you use technology at home?

MY FAMILY

How many people live in your home?

____

What are your parents/carers jobs?

____
____
____
____

Can you list the people living in you your home and their ages?

Name	Age

In the space below, list of all the technologies in your home. Include the number of each technology type in your home.

e.g. laptop – 2

Our Technology Timetable

Work with you family members to list the things that your family members do on the computer and with the Internet.

Who	Technology	Location	Purpose (why)	Amount of time per week
E.g. Mum	Computer & Internet	Lounge room	Buy things on ebay	7 hours
Big sister	Laptop & Internet	Bedroom, lounge room & kitchen	facebook	14 hours

Appendix F – Questionnaire lesson plan

<table>
<tr><td colspan="3">Primary Questionnaire Lesson</td></tr>
<tr><td colspan="3">Purpose: The purpose of the questionnaire is to provide information on age, gender, cultural background, socio-economic status in terms of parent's occupation and education levels, as well as their personal use, engagement and familiarity with ICT. Questionnaires will be completed by students then taken home to be checked with their parents. Administering the questionnaire in this way allows data to be member checked for accuracy and reliability (Yin,1994). Background data from the questionnaire will be used together with other data sources to build student technology profiles in order to better understand participating students' technology use.</td></tr>
<tr><td colspan="2">Resources: Class set of questionnaires, board for class brainstorm, all students will need to use pens as pencil will not copy clearly</td><td>Time: 30-40min</td></tr>
<tr><td>Introduction</td><td>Introduce the questionnaire worksheet
Inform the students the purpose of the lesson –
Today we are going to think about the way that we use technology. All of the different things you do with computers, the internet and technology is really interesting. I would like you to share some information with me because I am really interested in finding out about all the different ways in which you use technologies.
So I would like us to work through this worksheet together. Before we begin lets talk about what I mean by technology
Ask students what technology they use at home. Brainstorm on the board the types of technology they use at home that is relevant to project.
Explain to students that there answers will all be different as they are each unique and that they need to be as honest as possible.</td><td>Notes:</td></tr>
<tr><td>Body</td><td>Hand out questionnaire to students, allow students to fill in the About me section while handing out.
Start with the 'score card' section. Explain a likert scale and ask them to really think about where they would sit on this rank. Ask the class teacher to rank themselves as an example.
Focus students' attention to 'My technology timetable'. Discuss each category using the example ask students to be specific as you don't know their home (table for location where is the table? If you use an Ipod all</td><td></td></tr>
</table>

	over the house, write that and then tell me the place you use it most). Allow all students time to complete and let them know they can have more space if they need it. • Focus students' attention to open ended questions. Work through each question as a class, answering any student questions. Encourage students to be as descriptive as possible.	
Conclusion	• When all students have finished turn questionnaire over go through each section and explain that this is the part that they will complete with Mum or Dad or Nan (whoever looks after them at home). Tell students that they need to share the first side with that person as well and maybe make some changes as *Mum and Dad might have a better idea about some of the information you shared or they might help you to remember other ways you use technology.* Answer any questions. • Explain to the students that you are going to collect sheets to copy and then return to them to take home straight afterwards. • Encourage students to fill in form with parents ASAP.	•

Appendix G – ICT task interface

Home Working with Information Creating & Sharing Information Checklist

Working with Information

Part A:

Use the links below to learn about flags

http://www.wearemulticolored.com/

http://www.wearemulticolored.com/glossary.php

http://www.worldflags101.com/

AND THEN...

1. Open a word doc.

2. Save it to your desktop is your ***firstname_flagfacts***
   example: john_flagfacts

3. Make a list of important facts about flags as you read.
   Use the heading ***FLAG FACTS***

4. Now use a search engine to find another **good** source of information that tells you about the history of the australian flag. Add three important facts about the australian flag to your list.

5. Copy and paste the URL of your chosen website into your document underneath your facts. Then explain why you chose this source.

You should now have enough information to write a short report about flags. Write your report in your flagfacts word doc underneath your facts. Use the heading ***FLAGS.***

WHEN YOU HAVE FINISHED YOUR REPORT read through, edit, format and save your document.

Next

Home Working with Information Creating & Sharing Information Checklist

Creating & Sharing

Part B:

Now you have an understanding about flags & symbolism, its time to think about what colours and shapes you would use in your own flag.

Open the *index.html* file in the *flagforournation* folder on your desktop.Watch the slide show about the development of the Australian national flag and other significant Australian flags.

AND THEN...

1. Design your own flag, choosing a variety of elements to symbolise what Australia represents.

2. When you have finished your flag take a screen shot (command + shift + 4)

4. Now insert your flag into your flagfacts word doc under the heading ***MY AUSTRALIAN FLAG***

5. Finally include a description underneath describing the colours and shapes in your flag what they symbolise.

DONT FORGET TO SAVE THE CHANGES TO YOUR YOUR DOCUMENT

Next


A flag for the nation
Activity
Australia's national flag
Today's Australian flag was first flown in September 1901, the year of Federation.
The British Union Jack is in the top left corner. To the right are the five stars of the Southern Cross – a symbol of where Australia is placed on the globe.
Below the Union Jack is the Commonwealth star. It has seven points: one for each of the states and one for the territories.
The Australian national flag
Slide 1 of 11

Home Working with Information Creating & Sharing Information Checklist

Checklist

Congratulations, you are almost finished...

Use the checklist below to make sure you have completed all tasks properly.

Checklist

- ☐ I have a word doc saved as **myname_flagfacts**
- ☐ I have a list of flag facts in my word doc under the heading **FLAG FACTS**
- ☐ I have included the **URL** of my chosen site *AND* explained why it is a **good source of information**
- ☐ I have a short flag report in my word doc underneath the heading **FLAGS**
- ☐ I have a screen shot of my flag design in my word doc underneath the heading **MY AUSTRALIAN FLAG**
- ☐ I have included a **description below my flag** in my word doc
- ☐ I have read through my work, edited and formatted so that it can be shared.
- ☐ I have saved my word doc to the desktop

WHEN YOU HAVE CHECKED THAT YOU HAVE COMPLETED ALL OF THE ABOVE TASKS RAISE YOUR

Appendix H – ICT task delivery protocol

<table>
<tr><td colspan="3">Primary ICT Proficiency Task (PT)</td></tr>
<tr><td colspan="3">Purpose: The PT is designed to capture how students engage with computers, computer software and the Internet while negotiating through the six key processes of ICT literacy. The PT task will be conducted online during regular class time. The task itself will run in live web browser accessible to all students, drawing from the Hybrid Assessment Modules used in the National Assessment Program of ICT literacy (MCEECDYA, 2005 & 2010). However, for the purposes of this study the task will be smaller in size with screen recording software capturing all students’ actions during the designated task period. The tasks will differ in focus, based on curriculum outcomes, and degree of difficulty for each class group. Task difficulty for Year 6 and Year 10 students will align with MCEECDYAs (2010) expected bench marked progress levels for each group.</td></tr>
<tr><td colspan="2">Resources:
Computer Lab, site & LO, all student DEC log on, printed checklist, spare paper, pens,</td><td>Time: 2 hour morning session</td></tr>
<tr><td>Introduction</td><td>Introduce the task, explain to the students that they need to listen carefully, read all instructions.
Show the students where the site and LO are sitting on local folder, demonstrate how to access.
Have all students open both and minimise LO for later
Explain that the task will be conducted in two parts and that you will spend an hour on the first part then stop to talk about part b before you begin.
Explore the website and steps including the checklist, talk to students about the importance of the checklist. Handout printed copies</td><td></td></tr>
<tr><td>Body</td><td>PART A
Explain the ‘design a flag’ task to students in terms of their learning and end product – Today we are going to work through this task to learn about flags and design our own. We are going to look at information about flags and think about their importance and how they symbolise the country or group the represent. This task will help you with your Government project because you need to design a flag as part of the project so you might get an idea of the types of symbols, shapes and colours that could represent your own country. This task is based upon an Australian wide assessment of year six students. I want you to try your best, and be careful to listen to all instructions. If you have a question please put your hand up and we will do our best to help you but remember we are</td><td></td></tr>
</table>

	interested in what you can do so we will only be able to point you in the right direction. • Direct students Debut, demonstrate how to launch application and start recording. Explain Process. • Ensure all students are recording their screens and then begin the task. • Circulate room, after approx 40min let students know that the should be coming towards the end of Part A. Have them do a self check against task checklist let them know the time remaining • With 5 min to go instruct all students to save their work and minimise word doc. PART B • Reflect on the information gathered in during Part A. Inform students that they will now use this information as well as some new information from the LO to design a new flag for Australia. • Go through PART B steps & open LO showing students where the additional information is as well as the activity • Remind students how to take a screen shot • Circulate room, after approx 40min let students know that the should be coming towards the end of Part B. Have them do a self check against task checklist let them know the time remaining • With 5 min to go instruct all students to save their work and close word doc. • Have all students stop recording and save to desktop, explicitly model this process first.	
Conclusion	• Make sure all students remained logged in • Once students have been dismissed collect all work create a folder for each student.	

Appendix I – Interview protocol

Student Reflection Interview Schedule

Semi structured student reflective interviews are designed to gain a better understanding of a students engagement and proficiency, or otherwise, with the computer, computer software and the Internet, while completing the Phase one ICT proficiency task. As interviews are intended to be semi structured they will follow this brief structuring checklist with basic recall prompts as the participant and researcher walk through the participants previously recorded ICT proficiency task. The recorded task itself will guide the interview with allocated time at the end of the recorded task for open discussion. The purpose of using recorded tasks is to guide recall and enhance student reflection about their own ICT proficiency.

Sample Interview plan

Introduction

I'm not sure if you remember but I am interested in the way people use technology. The other day your class participated in a task online and I'm really interested in the way you completed your task, you did a great job and I would love to talk about it with you and ask you a couple of questions. Would you like to share your task with me?

Guided Recall

Lets have a look at what you were doing while you where researching (….) if you remember something interesting or you found something really easy or hard and u would like to stop the movie just let me know, I might stop it to if I think of a question I'd like to ask…

Play task (pause in areas of interest pre-marked on schedule)

Guided recall prompts

- I notice you did something interesting here, you ____ ____ ____
- can you tell me
  - How did you learn to do this?
  - Who showed you how to this?
  - What made you choose to do this (….)?
  - What was the easiest step? What makes it easy?
  - What was the hardest? What makes this harder?
  - Do you do things like this at home? Does anyone help you?
-

Discussion Questions

- A lot of adults seem to think all kids are experts with technology what do you think about this? Do you think kids are better at using technology than adults?
    -
- If you had to give yourself a score out of ten, one being basic and ten being an expert what would give yourself?
- Do you use the computer a lot? How often? What for?
    -
- Who else at home uses the computer? What for?
    -
- How did you learn to do things on the computer? How did you do that? (e.g. Did you play with it? Watch someone else?)
    -
- What do you do if you have a problem with the computer you can't fix?
    -
- What do you think computers are good for? Is there anything bad about computers?
- What do you think about using computers at school?
- What would you like to do with computers when you grow up?

Appendix J – Blog activities & student resources

BLOG ACTIVITITES

Investigating Information & Communication Technology at home

Stage: Three **KLA(s): HSIE and Science & Tech**

Overview

Students will discuss and record the types of technology they use within their home environment using a technology map and class blog space. They will conduct interviews with family members about their technology use, recording interviews in the class blog. Students will develop an understanding of the role of technology within their own lives and discuss why families or individuals opinions about technology might differ, as well as exploring the blog as a 'text type'

Outcomes

HSIE	
ENS3.6 Explains how various beliefs and practices influence the ways in which people interact with, change and value their environment.	• examines how natural, cultural, religious, historical, economic and political factors can influence people's interactions with technology
CUS1.3 Identifies customs, practices, symbols, languages and traditions of their family and other families.	• gives information about their own family background, including family technology practices • explains ways in which family members learn from each other • identifies characteristics that make another family different or similar to their own
Science & Tech	
IC S3.2 Creates and evaluates information products and processes, demonstrating consideration of type of media, form, audience and ethical issues.	• Considers own personal use when identifying and analysing future directions in information and communication technologies • Collects information about technology use within home and compares characteristics with other families • Discusses their own, use and consumption of ICTs and explains how they are affected • Evaluates the possible benefits of technology in relation to the personal, social and economic effects of its use •
English	

TS3.1 Communicates effectively for a range of purposes and with a variety of audiences to express well-developed, well- organised ideas dealing with more challenging topics.	• engages in more extended, productive group discussion with greater student autonomy

Learning Sequence

Lesson One - Classroom	Data
Start by discussing what ICTs are then have students list as many ICTs as they can think of with a partner. Share as an Icebreaker Ask students What they use computers and Internet for? What other people in the community use Computers and the internet for? And if think they are important and why? Discuss Explain to the students that we are going to investigate the technology outside of school and in their own homes including who uses it and the types of things they are using it for. To do this we are going to create a family technology map. Hand out A3 House worksheet. Discuss and model on the house handout (IWB) where the technology is in your house, draw it in and label have students do this independently. Discuss the types of things the students do with the technologies in their home. Share ideas then have students list in the same coloured pencil/font what they use the technologies for after modeling process. Conclude by sharing students work, exploring similarities and differences – do we all do the some things with technology, do we all like doing the same things? Do any if us not like using technology etc	This data will not be directly collected However the researcher may make notes about student discussion and brainstorm post lesson in a journal that may be included in description & analysis

Ask students to think about the way their family members use technology, paying attention to what happens at home when they go home tonight (create schema for next task).	Collect student work; make copies (back up). These artefacts will be collected (copied and originals returned to students) after lesson 2 for analysis. Data will provide background information about students 'family technology capital'
Resources Butchers Paper/whiteboard/IWB for brainstorm A3 Technology maps 1 for each student + spares Coloured pencils Access to photocopier	
Lesson Two – Computer Lab	Data
Class Blog Discuss Blog as a text and compare difference between private journal and public blog. Have students share what they know including any previous experiences. Provide students with their account details. Give a quick overview of access, chosen blog functions, set-up, editing etc. demonstrating on IWB or projector. Possibly use BlogEd student tutorial. Explain to students that we are going to use the blog as a space to keep a record of our investigation. More specifically to; • share information about their own family technology practices, • explain ways in which family members learn from each other, and • identify characteristics that make another family different or similar to their own.	Classroom discussion will not be recorded, however the researcher will make contextual notes post lesson in journal that may be included in description & analysis
Have students create a post to introduce themselves to you, they might include the technologies they use and their favourite and least favourite uses of ICTs at school and home.	Blog entries will be collected for analysis.

Explain to students that they will use this blog again to record their family interviews (home work task lesson 3) in the blog space and a final reflection. Where and how this is done will depend on access and family support – either at home or school – needs to be equitable. Conclude by reading some of student's posts and ask students to comment on posts. Discuss appropriate comments.	
Resources Computer lab with projector or IWB – booked in advance Blog Ed – set up for class, researcher added as moderator (if possible, otherwise external blog maybe easier) BlogEd/alternate blog student support video	
Lesson Three - Classroom	Data
Re cap on previous technology map lesson, ask students if they paid any attention to technology activities of their family members discuss. Explain they were asked to start thinking about their families technology use because today they are going to be looking at how their family members use technology. Adding to their technology map. (Students who have parents that do not live in the same house should still include them in their map, depending on what the student might like to do – could add to their own map or start a new map for second home). Have students make a list of immediate family down the side of their map being careful to use a different colour pencil for each person (Model and reinforce this process). For each family member have students map the technology they use and the types of tasks they use it for, being careful to stick to the same coloured pencil as the key they have just made. Students should list the family members name next to the technologies the use/or circle including the types of tasks they use the technology for (again, model and reinforce this process). Conclude by sharing student work discussing similarities and differences. Collect student work, copy and hand back. Set homework task. Homework Task 1.Students are to take technology map home to show family, do they agree with what students have written or have anything to add.	Classroom discussion will not be recorded, however the researcher will make contextual notes post lesson in journal that may be included in description & analysis Collect student work; make copies (back up). These artefacts will be collected (copied and originals returned to students) for analysis. Data

2. Family Interviews – Over the following week students will interview family members about: the technology the use daily, the purpose of use, what they think about technology – what it means in their lives. Students will be provided with question sheet and asked to record answers in homework book or interview journal provided to students. This work will be published in class blog (either at school or possibly at home, depending on access and support).	will provide background information about students 'family technology capital' Member checking
Resources Students A3 Technology maps from previous lesson + spares Coloured pencils Access to photocopier Printed homework task	
Lesson Four – Computer Lab	Data
Class Blog Provide time for students to enter their interviews in class blog and share these. Encourage students to share their posts with their families at home that afternoon and make comments from home on their own or others posts Finally, ask the students to reflect about how they use technology, how their family uses technology and similarities and differences between how other students and families us technology to think about what technology means to them in their own lives? Explain that this might be different for everyone, share what it means for you and possibly the classroom teacher then have students independently write own blog entry. Note: this may need to be a lesson on its own or another homework task depending on time	While these comments may not be useful they encourage family input and provide a simple form of member checking. Blog entries will be collected for analysis.
Resources Computer lab with projector or IWB – booked in advance Blog Ed – set up for class, researcher added as moderator (if possible, otherwise external blog maybe easier)	

*Interviewer:*_______________________

My Family Technology Interview

Interviewee____

What technologies do you use everyday?

____

____

____

____

Why do you use these types of technology?

____

____

____

____

What do you think about technologies like computers and the Internet?

____

____

____

Are they important in your life? Why?

____

____

____

____

Appendix K – Analysis plan

Data analysis plan

Data Source	Process	Theory/strategy
Questionnaire (Unit 1)	Word process student questionnaires Create individual student file (basic technology profiles.	
	Collate questionnaires – tabulate by question for comparison	
	Analyse each question for emerging themes/categories as they appear as well as using guiding theory. Reduce and recode	Constant comparative method (Merriam, 1998) Theory of practice
	Summarise each question by collating themes and categories and interesting or unusual data. Analyse each summary together with theory of practice (informed construction of questionnaire) code were evident	Theory of practice
	Summarise the summaries in a separate collated questionnaire summary document Include theory notes in summary	
Questionnaire *Parent occupation groups*	Code students according to parent occupation Use the highest ranked classification to sort students into professional and non-professional family groups	ASCO classification scheme
	Compare responses for each group by collating themes and categories and interesting or unusual data. Analyse each summary together with theory of practice (informed construction of questionnaire) code were evident Consider positioning of groups against school field, available technological capital (Selwyn, 2004)	Constant comparative method (Merriam, 1998) Theory of practice

	Summarise differences and/or similarities for each group add to questionnaire summary doc	Theory of practice
ICT TASK data (Unit 2*)* *Preliminary Analysis selection of Unit 2*	Selection of Unit 2 – six students to participate in Phase 2 Following ICT task review printed artefacts with class teacher identify variation in results based on final product. (9 students identified) Using the rubric and digital recording score and record ICT task performance (6 embedded participants identified - 3 high, 2 low, 1 average level of performance, all exhibiting a range of behaviours throughout the task) Summarise behaviours for each student and add to interview protocols	Marking rubric Processes of ICT literacy
ICT TASK data (Unit 1)	Initial scoring of three tasks (revision of rubric to allow a clearer differentiation between student work + the addition of space to record behaviour observed in digital recording) Score all student ICT tasks using printed work and video recordings against rubric (including the 6 selected students whose tasks were initially scored during preliminary analysis)	Marking rubric Processes of ICT literacy
	Tabulate scores for comparison in excel Summarise results for each sub-task including descriptions of the processes students engaged with while completing sub-task, include examples from raw data. Compare results between boys and girls	
ICT TASK & questionnaire	Compare results between family background groups	ASCO classification scheme
	Add results to individual student files (basic technology profiles)	
Interviews	Send away for transcription	
	Listen to audio and check transcripts fill in	

	blanks	
	Put transcripts into a table and code for 1. emerging themes 2. evidence of framing theory 3. processes of ICT literacy	Constant comparative method (Merriam, 1998) Theory of practice
	Summarise details of emerging themes/theory for each interview Include family background data	
	Compare emerging themes across interviews and then between family backgrounds	
Technology profiles (Unit 2) *Questionnaire, ICT task & interview*	Add interview summaries to embedded participants technology profiles	
Blog tasks (Unit 1)	Copy blogs in word processed file	
+ **Questionnaire**	Transcribe and tabulate in spread sheet – according to family and then family member Add demographic data Allow the production of family practice and view/value of ICT summaries Code and compare practice and value statements – families & family groups Produce summaries	Constant comparative method (Merriam, 1998) Theory of practice ASCO classification scheme
Technology profiles (Unit 2) *Questionnaire, ICT task, interview &*	Add to blog family summaries to 6 embedded participants technology profiles Analyse technology profiles according to theory of practice – restructure according to theory of practice to allow detailed description of structures and agency that may presuppose	Triangulation of sources – to uncover patterns of practice and establish conceptual

blog data	embedded participants ICT literacy practice	congruence (Merriam, 1998)
Create student narratives (Unit 2)	Collate theoretical analysis into spread sheet according to habitus, capital, field to allow further comparison of the ways that students ICT practices were structured	
	Devise a student narrative structure according to data source & guiding theoretical construct (included in thesis Table 12)	
	Conduct field analysis (Grenfell, 2012) 1. Consider the positions of family members in relation to family ICT practice paying attention to the impact this had on students home and school-based ICT literacy practices 2. Consider the habitus of students (apprehended through analysis of practices and preferences) in context of their available resources (economic, cultural and social capital) 3. Consider the families practices in relation to the broader field of practice i.e. analysis of practices between family groups considering their social positioning in the school field (professional – non professional families). Create summary at each level of analysis, for each student code ICT experiences according to transformation, restriction and reproduction. Final summary report for all students	ASCO classification scheme Three level field analysis (Grenfell, 2012)

Appendix L – Questionnaire analysis sample – first level inductive analysis

Question a

Do you like using computers and the Internet? Can you tell us why?

SC	Response	Theme
1CB	*I like using the Internet because there are good sites.*	*Searching*
2DB	Yes I do cause I can use the internet to search things up and I can check my facebook and my email.	Facebook Email Searching
3KC	I love using computers it helps a lot with homework and speeches and you can talk to people around the world.	Homework Communication
4BC	I like using computers because of facebook and games although im not good at using it	Facebook gaming
5EH	Yes, I like going on games and on facebook	Facebook gaming
6DK	I like using computers and the internet because you can email friends, do research, and play games.	Searching Email Gaming communication
7JL	Yes, because I can talk with friends & family, play games & listen to music.	Communication Gaming Music
8KO	I do like using the Internet because its fun finding out new things	Searching
9LP	Yes because I like to go play games and go on facebook and talk to my friends	Gaming Facebook Communication
10KR	Yes because you can go on games and facebook so you don't get bored and you can stay in touch with friends and family.	Gaming Facebook Communication
11GS		
12CT	I do like using computers and the internet because you can talk to friends and play games.	Communication gaming
13JB	I do like using computers because it is a source of entertainment	Entertainment
14AB	Yes, because you can do so much stuff	
15MD	I do like using computers so you can go on facebook and talk to your friends	Facebook Communication
17HD	I do because I use it for homework, when I need help and I also use it for other applications.	Homework
18JE	Yes because you can talk on facebook to people and play games	Facebook Communication Gaming
19CE	I do like using the Internet for games and work and emails	Gaming Homework
20JH	Yes because you learn a lot of things on the Internet	Learning
21MK	I do like using computers because you can talk to friends on facebook	Facebook Communication
22AN	Yes because you can talk to friends and family	Communication
25MP	I do like using computers and the Internet because its fun to use	Fun
27HW	I do like using computers because it can be very useful	Homework

	for research and do reports and there are great games.	Games
28LV	Yes because it opens up a whole new world like editing its like an art	Editing video creativity

- All students 'like' using computers and the Internet.
- One student discusses liking using computers and then mentions her low self-efficacy (4BC)
- Student explanations for the reasons the like to use computers and the Internet are fairly limited and most describe basic computer functions and Internet use. Themes identified include searching the Internet, Facebook, communication with friends and family, gaming, email and homework. One student mentions listening to music. Only one student discusses to more complex computer and Internet use referring to his enjoyment working with video editing software and uploading to You Tube. The student feels the technology has the ability to 'open up a whole new artistic world'
- Eight students make reference to Facebook as to why they 'like' using computers & the Internet.
- Ten students mention communication with family and friends as justification for why they like using computers and the Internet.
- Nine students discuss playing games as reason for 'liking' using computers and the Internet.
- Only five students mention homework and learning, with no one referring specifically to school learning. Four students mention searching the Internet without a specific topic.

Question b

What is your favourite activity using computers and the Internet?

SC	Response	Theme
1CB	*blank*	
2DB	Yes I do cause I can use the internt to search things up and I can check my facebook and my email.	*Searching* *Facebook* *Email*
3KC	*My favourite is facebook my uncle lives far away and I always talk to him*	*Facebook - Chatting with family*
4BC	*Facebook because I like talking to friends*	*Facebook – chatting with friends*
5EH	*Facebook and games. Facebook because I can chat with my friends.*	*Facebook – chatting with friends* *Gaming*
6DK	*I have printmaster (card making program) and getting pictures off the Internet. I also like ebay!*	*Software (cardmaking)* *Searching images* *ebay*
7JL	*Facebook & You Tube because I love listening to music and talking to friends.*	*Facebook – chatting with friends* *You tube – music*
8KO	*Playing games and finding new things out on the Internet*	*Gaming* *Searching*
9LP	*facebook*	*Facebook*

10KR	*Facebook cause you stay in touch with family and friends*	*Facebook – keep in touch with family and friends*
11GS		
12CT	*My favourite activity would have to be facebook because I can talk to my friends.*	*Facebook – chatting with friends*
13JB	*COD, MW2* Online because its fun and most of my friends do it	*Online gaming with friends*
14AB	*You Tube because you can watch funny videos*	*Youtube*
15MD	*My favourite activity is facebook because you can talk to friends and chat to each other*	*Facebook - chat with friends*
17HD	*I like using the computer because my dad teaches me how to install an download things on it*	*Using with dad Learning software installation*
18JE	*My favourite thing is facebook because you can talk to people*	*Facebook - chat*
19CH	*games*	*Games*
20JH	*Going online on my PS3 and facebook and ebay*	*Online gaming Facebook Ebay*
21MK	*My favourite activity on the Internet is facebook because you can talk to friends.*	*Facebook – chat to friends*
22AN	*I like games and MSN because you can talk to friends and have fun playing games*	*MSN – chat with friends games*
25MP	*My favourite activity using the computer is going on You Tube*	*Youtube*
27HW	*I like playing games on the internet because there are always some really good games online.*	*Online gaming*
28LV	*xBox online what makes it fun is if you get a HD PVR you can record yourself and put it on You Tube*	*Online gaming (recording and sharing vid) CREATING*

- Eleven students mention Facebook as their favourite activity. The majority of these students like to use Facebook chat to talk to their friends. Two students use the chat function to communicate with family members.
- Favourite activity is playing games. Four students specifically mention online gaming. One of these discusses creating and sharing video on You Tube of his gaming processes.
- Online - one student mentions MSN for chatting
- Two discuss eBay (this would have to be something done with parents or seen parents do learnt through objectified cultural capital)
- Two refer to software, one uses card making software as a hobby. The other discusses downloading and installing software, learning form his father.

Appendix M – Case student interview protocol sample

Emily (5)

Student Reflection Interview Schedule

Semi structured student reflection interviews are designed to gain a better understanding of a students engagement and proficiency, or otherwise, with the computer, computer software and the Internet, while completing the Phase one ICT proficiency task. As interviews are intended to be semi structured they will follow this brief structuring checklist with recall basic prompts as the participant and researcher walk through the participants previously recorded ICT proficiency task. The recorded task itself will guide the interview with allocated time at the end of the recorded task for open discussion. The purpose of using recorded tasks is to guide recall and enhance student reflection about their own ICT proficiency.

Sample Interview plan

Introduction

I'm not sure if you remember but I am interested in the way people use technology. ~~The other~~ Yesterday day your class participated in a task online and I'm really interested in the way you completed your task, you did a great job and I would love to talk about it with you and ask you a couple of questions. Would you like to share your task with me?

Guided Recall Name here with

Lets have a look at what you were doing while you where researching (….) if you remember something interesting or you found something really easy or hard and u would like to stop the movie just let me know, I might stop it to if I think of a question I'd like to ask…

Play task (pause in areas of interest pre-marked on schedule)

Guided recall prompts

I notice you did something interesting here, you C+P how do yo do

4.50 - 5.50 . Uses keyboard command Why did you choose

deletes all info (why?)

can you tell me starts to type word 4 word ?

- How did you learn to do this?
- Who showed you how to this?
- What made you choose to do this (….)? 1
- What was the easiest step? What makes it easy?
- What was the hardest? What makes this harder?
- 2 Do you do things like this at home? Does anyone help you?

I notice you did something interesting here, you

16 highlights section to read
types chunks in own words
some synthes

can you tell me

2 - How did you learn to do this?
- Who showed you how to this?
1 - What made you choose to do this (….)?
- What was the easiest step? What makes it easy?
- What was the hardest? What makes this harder?
3 - Do you do things like this at home? Does anyone help you?

I notice you did something interesting here, you

17·42 Google search
different searches.

can you tell me

2 - How did you learn to do this?
- Who showed you how to this?
1 - What made you choose to do this (….)?
- What was the easiest step? What makes it easy?
- What was the hardest? What makes this harder?
3 - Do you do things like this at home? Does anyone help you?

27.15 choose first non advertised link
new search
first link

I notice you did something interesting here, you

52·42 formatting at the end
applies heading style

can you tell me

- How did you learn to do this?
2 - Who showed you how to this?
1 - What made you choose to do this (….)?
- What was the easiest step? What makes it easy?
- What was the hardest? What makes this harder?
- Do you do things like this at home? Does anyone help you?

What process.

Appendix N – Scoring rubric

Design a Flag - Marking Guide

This scoring guide contains a brief description of each of the items in the Design a Flag ICT assessment task.

Table 1 contains a summary of the items in the Design a Flag task and the possible maximum score.

Task	Descriptor	ICT Literacy strand	Max Score
1	Getting started	Creating & Sharing with Information	3
2	Flag facts – Use links to navigate to a website to compile a list of important facts within a word doc	Working with Information	2
3	Use a search engine to select an appropriate website ‘good source to add additional information to word doc	Working with Information	3
4	Locates appropriate information	Working with Information	2
5	Includes URL & justifies choice	Working with Information	2
6	Use information to synthesis short report under the heading Flags	Creating & Sharing with Information	3
7	Opens learning object, completes activity	Creating & Sharing with Information	1
8	Takes a screen shot of flag image	Creating & Sharing with Information	1
9	Imports the image into word doc	Creating & Sharing with Information	1
10	Describes and justify flag design using concepts from tasks 1-3	Creating & Sharing with Information	3
11	Formats headings, font, style and size to reflect structure and consistency	Creating & Sharing with Information	2
			23

Task 1

Getting started

Score 1: opens word doc.

Score 1: Uses heading ‘Flag Facts’

Score 1: Saves document firstname_flagfacts to the correct location

Total /3

Task 2

Flag facts

Score 2: Types or copies and pastes information, checking for relevance and editing for logic and sequence.

Score 1: Copies and pastes information without checking for relevance, editing and logic.

Score 0: No facts or vague and irrelevant information

Total /2

Task 3

Use a search engine to select an appropriate website ‘good source to add additional information to word doc

Score 3: Uses a search engine selecting relevant keywords and selects an appropriate website

Score 2: Uses search engine with some relevant keywords and selects an appropriate website

Score 1: Uses search engine with some relevant keywords, chooses the first listed web site in search

Score 0: Doesn’t use search engine to locate appropriate website

Total /3

Task 4

Locates appropriate information

Score 2: Adds at least three relevant & useful facts, checking for relevance and editing for logic and sequence.

Score 1: Adds facts that may be somewhat relevant or useful, does not check for relevance or edit for logic.

Score 0: No facts or vague and irrelevant information

Total /2

Task 5

Includes URL & justifies choice

Score 2: Includes URL and provides sound justification referring to reliability and relevance.

Score 1: Includes URL and attempts to justify demonstrating a basic understanding of reliability & relevance

Score 0: Includes URL with a vague or irrelevant justification.

Total /2

Task 6

Use information to synthesis short report under the heading Flags

Score 3: Paraphrases information to write a clear and logical description about flags

Score 2: Paraphrases information to write a short description about flags

Score 1: Reproduces information by C&P together a description about flags

Score 0: No short report or report is vague and irrelevant

Total /3

Task 7

Score 1: Opens learning object, completes activity

Total /1

Task 8

Total /1

Task 9

Score 1: Imports the image into word doc

Total /1

Task 10

Describes and justify flag design using concepts from tasks 1-3

Score 3: describes and justifies flag design including information synthesized from report.

Score 2: describes flag basically with some synthesized information from report.

Score 1: describes flag basically without synthesizing earlier information

Score 0: doesn't describe flag or description is vague or irrelevant

Total /3

Task 11

Formats headings, font, style and size to reflect structure and consistency

Score 2: selects appropriate headings, font, style, size and formats doc consistently

Score 1: formats document although inconsistent

Score 0: no evidence of formatting document

Total /2

Total /23

Appendix O – Scoring rubric student sample including processes

Student code 8KO

Task 1 Getting started		
Score 1	**Score 1**	**Score 1**
opens word doc. ✓	Uses heading 'Flag Facts' ✓	Saves document firstname_flagfacts to the correct location ✓
		Total 3 /3
full stop at beginning of sentence? – types as a bullet point		
adjusts documents to view both applications		
Doesn't save document straight away		
formats font size at beginning		

Task 2 Flag facts		
Score 2	**Score 1**	**Score 0**
Types or copies and pastes information, checking for relevance and editing for logic and sequence.	Copies and pastes information without checking for relevance, editing and logic. ✓	No facts or vague and irrelevant information
		Total 1 /2
1st source - symbolic use of colour		
types facts word for word (uses full stop as bullet point) Runs a spell check		
Only uses one link.		

Task 3 Use a search engine to select an appropriate website 'good source to add additional information to word doc			
Score 3	**Score 2**	**Score 1**	**Score 0**
Uses a search engine selecting relevant keywords and selects an appropriate website	Uses search engine with some relevant keywords and selects an appropriate website ✓	Uses search engine with some relevant keywords, chooses the first listed web site in search	Doesn't use search engine to locate appropriate website
			Total 2 /3
'flag facts'			
selects 2nd link (schools in the title). 25.14			
'australian flag' – selects 1st link			

Task 4 Locates appropriate information		
Score 2	**Score 1**	**Score 0**
Adds at least three relevant & useful facts, checking for relevance and editing for logic and sequence.	Adds facts that may be somewhat relevant or useful, does not check for relevance or edit for logic.	No facts or vague and irrelevant information ✓
		Total 0 /2
types part of one fact word for word without heading – fact doesn't fit		

Task 10 Describes and justify flag design using concepts from tasks 1-3			
Score 3	**Score 2**	**Score 1**	**Score 0**
Describes and justifies flag design including information synthesized from report.	Describes flag basically with some synthesized information from report.	Describes flag basically without synthesizing earlier information ✓	Doesn't describe flag or description is vague or irrelevant
			Total 1 /3

My Australia flag has the Union Jack, below the UJ is Australia witch represents Australia as how beautiful it is and the seven stars represent the seven stat.

Task 11 Formats headings, font, style and size to reflect structure and consistency		
Score 2	**Score 1**	**Score 0**
Selects appropriate headings, font, style, size and formats doc consistently	Formats document although inconsistent and/or inappropriate ✓	no evidence of formatting document
		Total 1 /2

runs a spell check after completing each section

lge font size.

12/23

52%.

Appendix P – Embedded student technology profile – Aaron

Well I never asked my sister how to print, I just told her, 'Can you print this for me', and she'd do it - Aaron

Aaron learnt to use the computer his sister. He also includes the school librarian as a source of learning. When Alan 'gets stuck' or needs help with technology he will ask his sister or father. Aaron gives himself a self-efficacy rating of five out of ten in his interview. Overall he scored highly on his ICT literacy task 70%. He demonstrates a sound ability across all process of ICT literacy. He is able to perform low- level *accessing* and *managing information* process along with more challenging *evaluating, developing new understandings* and *communicating with others* processes. Aarons level of synthesis and transfer of knowledge was evident across task steps.

The details of Aaron's ICT task are summarised below

Task	Description	Score
1	Aaron accessed all relevant materials and organized files appropriately	2
2	Aaron uses the first given source and types information word for word. Accesses the second source doesn't use.	1
3	When conducting his own search he reads and evaluates a number of sources. Highlighting text to track as he reads. Aaron modifies his keywords twice, adding 'info about 'and then searching specifically for Australian flag.	2
4	Aaron adds three relevant and useful facts, checking for relevance and editing for logic and sequence – Highlighting text to track as he paraphrases	2
5	He includes the URL of his chosen source and justifying his use in terms of relevance and audience ' I chose this site because it has a good source of information about he Australian flag and it was easy to read'	1
6	Alan synthesizes collected information into two sentences before moving on. 'Flags are really cool ways to represent your country. Flags have all different colours that have meanings (example the Australian flag has blue red and white with the Southern Cross and the union jack'	2
7-9	Aaron completes a flag of his own within the learning object and imports into his report	3
10	Aaron is able to describe his flag design simply using his synthesized understanding of colour and symbolism. He includes the southern cross and union jack and describes them as representing 'themselves' – without unpacking: 'The yellow represents the sand on the beaches and the green represents the forests and the land on Australia. The bird represents he wildlife in Australia. The starts represent the southern cross and the union jack represents itself.	2
11	Aaron formats document although this is not consistent throughout. Uses 21pt font size.	1
	Aaron completes his task in one hour and twenty minutes. At this time he reads through his work.	70%

<table>
<tr><th colspan="3">Field</th></tr>
<tr><td colspan="3">Aaron is exposed to a number of technology related practices through his home field. All members of the family use technology. The techno-culture of the field is framed by Aaron’s parents (father) and oldest sister. In Aaron’s home field value is placed on tasks for work and study rather than leisure. Aaron and his younger brother both hold positions of least power in the family. They use technology together for playing games, which Aaron chats about enthusiastically. Apart from his younger brother Aaron is unclear about the type of tasks family members engage in.
Aarons Dad followed by his oldest sister both hold dominant positions in terms of technology use, setting rules and tone for family use. Aaron relies on his sister for technology support and will ask her first if there is a problem. The technology resources of the field reflect the power relations in the home with Aarons father and oldest sister owning their own laptops, while his mother and younger siblings share the family laptop in the study.</td></tr>
<tr><th>Economic Capital</th><th>Cultural Capital</th><th>Social Capital</th></tr>
<tr><td>Professional background
Access to a range of resources
Shared laptop computer (Mum & 3 siblings)
Dad & older sister have own laptop</td><td>Institutionalized
Aaron discusses his participation in school computer skills program, which all students attend weekly, as a source of learning of her technology related skills.
Embodied
Doesn’t demonstrate self-interest in learning. Discusses having his sister ‘do it’ for him
Occasionally visits computer lab at lunch
Objectified
Resources allocated for work & study
Value on work/study related tasks
Leisure tasks limited
General idea purpose of parents use (related to work)</td><td>Sister
Dad
Sister
Mum

School
Teacher</td></tr>
<tr><th colspan="3">Habitus</th></tr>
<tr><td colspan="3">Dislikes homework
Likes playing games and chatting on MSN
Occasionally visits computer lab at lunch</td></tr>
</table>

Appendix Q – Cross case theoretical analysis - technology profile data

	HOME FIELD	**HABITUS**	**ECONOMIC CAPITAL**	**SOCIAL CAPITAL**	**CULTURAL CAPITAL**
	Home environment including resources, available & location of resources, culture of technology use (doxa), contacts, rules surrounding use and position within field	*Personal disposition and orientation toward the use of or experiences with technology (Practices and preferences)*	*Material resourcing of students' home and school environments including quality, quantity of equipment and capacity for maintenance and upgrade of equipment (Selwyn, 2004)*	*Students' network of 'technological contacts' and support (Selwyn, 2004).*	*Embodied Self interest in investing time into self-improvement of ICT skills (e.g. experimenting, self-discovery, play based learning episodes). Objectified Socialization into technology use and 'techno-culture' via techno- cultural goods (Selwyn, 2004)*
22 AN	Lives at home with: Mother Father 2 x older sisters 1 x younger brother ICT use occurs in shared spaces; computer room (computer), lounge room (gaming consoles) and throughout the house (handheld gaming consoles). DOXA: Tasks related to work or school are highly valued compared to leisure tasks Game playing and long periods engaged with ICT are assigned a negative value	Aaron likes using computers and the Internet for communication with family and friends. Favourite activities - playing games and chatting on MSN. Least favourite - studying (which he writes in capital letters), due to the associated searching. Ave weekly use of technology - (10hours) playing games on gaming machines (PS2, PSP, Xbox 360) throughout the house. Completes schoolwork in a devoted computer room (4.5hrs).	Professional family background. Father – Pathologist Mother - studying at TAFE and looking for a Job. 1 x family computer (shared between Aaron and 2 siblings and mother) 2 x laptops owned by Aarons father and older sister	Family members all use technologies throughout a regular week for a range of tasks including work, study, homework and Facebook. Everyone in the family uses technology for work and study apart from his younger brother who plays games. Learnt to use the computer from his	OBJECTIFIED: Parents reflect on their ICT use positively followed with caution. Making positive statements and then acknowledging that ICT use within their home and more broadly in society is not without problems. This caution is evident when Alan and his siblings discuss technology as

		Self efficacy rating of three out of five in his questionnaire and five out of ten in his interview. Overall he scored highly on his ICT literacy task 70%. Aaron expresses an indifference to learning about ICT (computer/internet) explaining often he isn't sure how to perform certain functions so rather than 'figure it out' or ask for help he has his sister do it for him as this is easier		sister. He also includes the school librarian as a source of learning. When he needs help he asks his sister or father.	helpful although shouldn't be used for games or for long periods.
14 AB	Adam lives at home with Mother Father 1 x younger brother ICT use occurs in shared spaces. Technology use is closely monitored in Adams house he is not allowed to have a Facebook account or engage in long periods browsing the Internet DOXA: In Adams family work related tasks are valued. Other tasks (those undertaken by kids) are considered of lesser importance Children's computer and Internet use is closely monitored and restricted	Adam likes using computers and the Internet for…PlayStation, computer, Xbox, and TV. I like playing call of duty on Xbox. (No discussion of computers/Internet) Favourite activities - *You Tube because you can watch funny videos*. Least favourite activities *HOMEWORK because it is boring*. Ave weekly use of technology - 15 hours per week using technology at home. 11hours playing PlayStation, 1 hour completing homework and 3 hours watch You tube and browse the Internet Adam gives himself a self-efficacy rating of 4 out of 5 in his questionnaire and a six out of ten in his interview post ICT literacy task. Overall he scored 48% in his ICT literacy task. Adam feels frustrated with the	Adam comes from a professional family Mother - accountant Father - sales representative 1 x desktop computer 1 x laptop Gaming consoles – 1 x Wii, 1 x PlayStation 2 & 2 x Nintendo DS	Family members all use technology throughout a regular week. Parents use laptop & iPod throughout the house for work & some Internet browsing. Adam and his brother spend most time gaming and enjoy viewing You Tube when they have access to the Internet. Learnt to use the computer from himself, teacher and then father Makes a distinction between skills he is	OBJECTIFIED: While Adams parents view technology as essential for work use and income they also make less enthusiastic reflections about computers and the Internet. For example, Adam and his brother both view computers and the Internet as important for homework and researching. Both boys express positive reflections in relation to their technology use.

		restriction surrounding his use. He is motivated to learn more about computers and the Internet. He also believes if his parents had increased ICT skill and knowledge he to would have an increased capacity for this skill and knowledge. Cannot wait until he can make his own choices about ICT use. He is particularly interested in having his own Facebook account		able to learn from his father and school. Believes he can learn more at school than at home	
12 CT	Lives at home with: Mother Father 1 x younger brother ICT use occurs in a dedicated study Gaming occurs in the lounge room and Carly and her brother use IPods for music throughout the house. DOXA: All ICT tasks are generally viewed positively Range of family ICT practices aligned with school values Carly did not describe any rules structuring her use	Carly likes using computers and the internet for playing games and talking to friends. Favourite activity - chatting with her friends with Facebook. Least favourite activity is researching and homework. Carly doesn't feel that she spends a lot of time using technology. She spends most of her timetabled technology use doing homework (5hrs). Facebook (4hours) listening to music on her iPod (1hr 15min). Carly gives herself a self-efficacy rating 5/10. She describes herself as "not bad, but not an expert." Overall she scored 57% on her ICT literacy task.	Professional family background. Father - business banker Mother - plant material supplies officer. 5x televisions 1x DVD player 1x Desktop computer, 1 x laptop computer, Fathers work laptop, iPods, IPhone, Wii, PlayStation and Xbox	Family members all use technology throughout a regular week for a range of tasks including work, schoolwork, home administration, social networking and entertainment. Learnt to use the computer from her brother and mother When she needs help she asks them both for help if she has a problem. Included the school librarian as a source of learning.	OBJECTIFIED: Carly's parents view ICT as an important tool for modern life, making information accessible and tasks quicker and easier. Her mother expresses some general frustration 'they are good until they break down'. Carly and her brother also view technology as significant in their lives.

		Carly discusses her skill level as being fluid explaining that if she had the opportunity to use technologies more and wanted to engage in more ICT practice she would be able to "learn much more about technology." Suggests some indifference towards engagement compared to peers Carly doesn't consider kids better at using technologies…Well not all kids are experts with technology, yeah they are good at like iPods and iPads and all but some find it really difficult to use a computer'			
2D B	Lives at home with: Mother Father 2x older sisters Maggie and Rose. ICT use occurs in shared & private spaces Nintendo lounge Darcy and her sisters access Internet with their personal laptops in their private bedroom spaces. DOXA Parents low/no skill leaves Darcy's older sisters to set the tone for technology use Darcy discusses guidelines for use as suggested by her sister Family ICT practices less closely	Darcy likes using computers and the Internet for searching, checking her email and Facebook. Favourite activity - chatting on Facebook. Least favourite activity is checking her email because she can't remember her password? Darcy spends most of her timetabled technology use on Facebook in her bedroom (5hours). The remainder of Darcy's technology use is for playing games (1hour), listening to music (40min) and schoolwork (30min). Darcy gives herself a self efficacy rating of five or six out of ten in her interview (after initially assigning herself a ten out of ten). Overall she scored 65% her ICT	Non-professional family background Father- traffic controller Mother – shop assistant 1 x desktop computer 3 x laptops connected to Wi-Fi Internet 1 x Nintendo 4 x iPods	Family members, apart from mother, use technology throughout a regular week for schoolwork, entertainment, social networking & home administration (looking at holiday destinations). Darcy's mother did not use computer unless it is with her husband to browse the Internet Darcy learnt to use the computer from her oldest sister Maggie She also includes included the school	OBJECTIFIED: Parents reflect on ICT as a 'necessary evil' and 'making things less personal' Darcy's mother feels ICT is not important as she doesn't use it while her father 'cant live without' them. Darcy and her sisters view technology positively, Her sister views the Internet as significant for accessing resources (for school) and Darcy describes her view of ICT with inexplicit marvel for example "you never

	aligned with school values All three girls engage with computers and Internet for extended periods Three girls are positive about ICT use Mother doesn't express an opinion' Father explains he couldn't live without his satnav.	literacy task. Darcy is motivated to use ICT at home and at school. She would like to engage in her home practices at school (Facebook chat). She would like to us ICT in her adult life as a teacher - IWB & photocopier Conceptualisation ICT bound by school and home experiences Darcy doesn't consider kids better at using technologies because some people are and some people aren't		librarian as a source of learning. When she needs help she asks her older sisters and then her Dad.	know what you can do with technology"
5E H	Lives at home with: Mother Older brother who doesn't live at home with Emily ICT use occurs in shared and private spaces. The dining room on the laptop. Emma plays games on her iPod and PS2 in her bedroom. DOXA: Tasks related to leisure and Emma's schoolwork are valued Emma's schoolwork is allocated the highest priority This priority seems to result in a closer match of home/school valued ICT practices Emma discusses learning a number of	Emily likes using computers and the Internet for playing games and Facebook these are her favourite activities. Least favourite activity is homework because it is really boring. Emily spends most of her timetabled technology use on Facebook (14hours) .The remainder of Emily's technology use is for games (2hours) and schoolwork (1hour). Emily gives herself a self-efficacy rating 5 out of ten in her interview. Although she believes this score will improve, as she gets older, due to increased level of use. Overall she scored 70% on her ICT literacy task. Emily expresses interest and motivation to use and engage with ICT at school and at home. She would like to be a	Non-professional family background Mother: Community care worker 3 x TVs 3 x phones 1 x laptop 1 x iPod 1 x PlayStation	Emma and her mother both use technology throughout a regular week for social networking, entertainment and homework. Emily learnt to use the computer by 'mucking around' and from her mother. When she needs help she asks her mother and if she doesn't know what to do they just leave it.	OBJECTIFIED: Emily's mother reflects on her technology use generally as it 'makes life easier' it is important to her for communication. Emily views technology as important for entertainment. Emma discusses watching her mothers ICT use She also discusses shared ICT practice with her mother for her schoolwork

	school-based practices within the ICT literacy task from her mother – detailing episodes of their shared practice Both Emma and her mother invest large periods on Facebook	software designer when she grows up. Emily would like to videoconference with someone in a different country in school. Emily doesn't consider kids better at using technologies because it depends how you learn.			
27 H W	Lives at home with: Mother Father 1 x younger sister His average weekly use of technology occurs in shared dedicated workspaces. The family access the Internet throughout the house and they have a dedicated study space adjoining the dining room. DOXA: Tasks related to work are more valued as opposed to entertainment-based tasks or take precedence Parents value ICT although make some critical judgment about its place in society	Hamish likes using computers and the internet because they are useful for research and great for games. Favourite activities - playing games on the Internet. Least favourite activities - typing a report or researching online. Hamish spends most of his timetabled technology use playing games online (3.5hours). The remainder of Hamish's technology use is for schoolwork (1hour). Hamish gave himself a self-efficacy rating of six to seven out of ten in his interview. Overall he scored 78% his ICT literacy task. Hamish will organise uses computer before school for game playing as this time is not conducive to homework that requires longer periods Hamish would like to use ICT as an	Professional family background. Mother & father - Both Hamish's Chemical engineers. 1 x desktop computer, 3 x laptops (2 x parents work computers), 2 x iPods, 1 x iPad 2 x mobile phones. The family access the Wi-Fi Internet throughout the house	Family members all use technology throughout a regular week for work, schoolwork, home admin, cricket admin, games and entertainment. Hamish learnt to use the computer from his parents although he considers his understanding as a result of being self-taught. Discusses watching his mother. When Hamish has a problem he asks his Dad because he is "good with computers"	OBJECTIFIED: Hamish's parents critically reflect on their technology use for a wide range of tasks along. Hamish's mother feels they save time her time and great work resource however in a broader sense she considers the impact of technology on society. While his father feels they play a major role in his life for a variety of purposes however he is sceptical of the cost Hamish and his sister view technology as "useful".

		adult like his parents – owning a worktop and travelling with it. Hamish doesn't consider kids better at using technologies than adults rather he attributes skill level to their home environment			

Appendix R – Chain of evidence

Collection Procedures

Data collection procedure	Time period	Approx. Timeline 4 weeks
Information and consent distribution	20min	Beg w1 (of data collection) Beginning or end of period
Questionnaire	20min	End w1 Beginning or end of period
ICT Task	60 -80 min	Beg w2 1 lesson researchers time before & after
Interview	Selected students only (max 6 interviews) 30 min each interview	End w2 Beg w3
Blog tasks	4 x 20-40min tasks	w3 & w4 2 lessons per week

- activities listed to fit within **school week**, **and not** restricted to the particular day i.e. to be moved around to fit in with elective timetable.
- NOTE: debut software to be installed prior to commencement of data collection plan

Suggested Timeline

W	Monday	Tuesday	Wednesday	Thursday	Friday
5		Information & consent distributed		Information & consent collected Questionnaire completed & taken home	
6			**SOUTHERN STARS**	**SOUTHERN STARS**	**SOUTHERN STARS**
7		ICT TASK – rescheduled due to length of time between		ICT TASK – cancelled due to SLS visit not scheduled in	

		interviews		school planner	
8	**ICT TASK** Task analysis	Task analysis Interviews	Interviews	BLOG 1 classroom	BLOG 1 classroom
9		BLOG 2 & 3	BLOG 4	BLOG 4	BLOG 4
10					

Audit trail

Date	**Data Collection Procedure**
Week 5	
Tuesday 16th August 2011	Met with principal received approval to begin. Met with class teacher, explained process and project commitment – collected signed consent Talked with [redacted] students about project, ran through information sheets and collected signed consent forms (2 students absent to follow up & 1 student not participating in data collection). Distributed PIS & CF

Thursday 18th August 2011	Piloted ICT proficiency task with [redacted] to test the functionality of site. No data was collected from students. As a result a number of changes were made to site and delivery plan to ensure smoother delivery during data collection. Changes to the site included: • Some wording to make instructions clearer • The addition of another item to student checklist (URL and explanation of choice of website as being a 'good source'. • One of the links was blocked by the DEC. An application to unblock the site has been submitted. Changes to the task delivery included: • Discussing the idea of flags and symbolism to make a clear link to class context. • Longer time period allocated (2 hour morning session). • Importance of stopping and refocusing students between Part A & B. • Lesson sequence documented to ensure accuracy between cases. i.e. one class doesn't receive clearer instruction or links to classroom context than another.
	Parent consent forms collected 23 out of 27 students consented to participation (2 students still absent & 2 students non consenting)
Week 6 –Southern Stars	
Monday 22nd August 2011	Distributed student and parent info & consent to AB & KR (absent students)
	Taught questionnaire lesson 1 absent DO – catch up next visit Copied student side and sent home family side to be collected on Friday 26th
Week 7	
Monday 29th	Collected questionnaires back from most students (absent student DO withdrew) Debut 17 day trial installed
Tuesday 30th	Scheduled ICT task – postponed due to stage assessment lab time. Tested Debut with class – logistics of running simultaneously, file size, file storage. Problems encountered 1. Necessary to turn sound recording off initially to reduce final file size. This to be done as an explicit step-by-step instruction. 2. Students can bump Debut in doc and stop recording. Remind students to check their filmstrip is still red throughout the recording (this indicates program is recording). Collected more questionnaires and handed out additional blanks to students who still hadn't returned.
Thursday 1st	ICT task – rescheduled due to Surf Life Saving visit and national song (not enough time). Final questionnaires collected total 24 full questionnaires (3 non consenting students)

Week 8	
Monday 5th	ICT Task – Two Hour lab time 3 students absent, total consenting students participating 22 ICT tasks completed in two hours Task analysis conducted afternoon/evening together with questionnaire data to select interview participants. Selected 6 interview participants with varying ability & background. Adam Aaron Hamish Carly Darcy Emma
Thursday 8th	Blog lesson 1 & 2 postponed due to strike
Friday 9th	2 blog lessons including technology map and family interviews. Students loved this lesson(s). Take home interview booklets and technology maps (to member check) to complete over the weekend.
Week 9	
Monday 12th	Blog lesson 3 & 4 – Students who had completed interviews, blogged about themselves.
Tuesday 13th	Remaining students completed blog posts All students blogged and data was collected from all consenting students.