

**A study of the experiences of middle school teachers during the initial stages of a
1:1 iPad trial.**

Craig Nicholls

Master of Education (Monash University)

**Submitted in partial fulfilment of the requirements for the degree of
Master of Education
Faculty of Education, Monash University
Melbourne, Australia
June 2014**

ABSTRACT

Since the early 1980's educational institutions around the globe have invested large amounts of both time and money into the exploration and implementation of a vast range of technological programs. This study focused on the recent and rapidly proliferating phenomenon, the 1:1 iPad program. These programs are characterised by each learner and teacher in a classroom using an iPad as part of daily routine. Since Apple released the first iPad in 2010 there have been studies and trials of this technology in classrooms in a variety of configurations. An investigation into the experiences of educators during these trials has been missing from the discussion and as such this study focused on the experiences of the teacher within the initial stages of a 1:1 iPad trial. It aimed to gain a better understanding of teachers' attitudes towards the use of iPads in their classrooms and their experiences working in a 1:1 environment.

The investigation occurred at the Country campus of Castle College, a multi-campus independent school found in the south-eastern suburbs of Melbourne, Australia. It focused on the experiences of six middle school (Years 5 – 8) teachers from this campus. In 2012, Castle College implemented a 1:1 iPad trial with all Years 5 – 11 students and teachers at the Country campus. This decision represented a significant change in approach for the college and potentially steep learning curve for the teachers involved. In conducting this qualitative case study, data was collected during the initial six months of the iPad trial through observations, semi-structured interviews and questionnaires. Taking this approach created an opportunity to explore the participants' experiences when integrating iPads into their classes for the first time.

This study found that implementing a 1:1 iPad trial, perhaps unsurprisingly, increased the workload of the teachers involved. The participants generally felt that the teaching in a 1:1 iPad environment allowed them to move their students through the curriculum with greater depth and speed. This was achieved through students accessing online resources, creating content and an increase in communication (created by students having easy access to their email). In what could be considered a surprise, these benefits created a situation where an increased workload was generally deemed acceptable by the participants.

This study also confirmed the findings of other studies; in that the importance of professional learning when implementing a new technological initiative into a school cannot be overstated. The study does, however, bring a new slant to the discussion in

the form of introducing technological domestication theory and the potential to use this to sculpt and target individual professional learning experiences for educators. This however was not the main focus of this study, and further investigation into this area, including developing a matrix of behaviour and a skills checklist, would be beneficial.

TABLE OF CONTENTS

ABSTRACT.....	I
LIST OF TABLES.....	VI
LIST OF FIGURES.....	VI
COPYRIGHT NOTICES.....	VII
DECLARATIONS.....	VIII
ACKNOWLEDGMENTS.....	IX
CHAPTER 1 – INTRODUCTION.....	1
1.1 AIMS OF THE RESEARCH.....	2
1.2 CONTEXT OF THE STUDY.....	3
1.3 RESEARCH QUESTIONS.....	4
1.4 STRUCTURE OF THE THESIS.....	5
CHAPTER 2 – REVIEW OF THEORY AND RESEARCH.....	7
2.1 INTRODUCTION.....	7
2.2 TECHNOLOGICAL DETERMINISM VERSUS SOCIAL SHAPING THEORIES.....	7
2.2.1 Technological Determinism.....	8
2.2.2 Social Shaping Theories.....	9
2.2.3 Domestication of Technology Theory.....	11
2.3 1:1 PROGRAMS WITHIN SCHOOLS.....	12
2.3.1 1:1 iPad Programs.....	12
2.3.2 A brief history of 1:1 programs.....	14
2.3.3 The academic impact of 1:1 programs.....	15
2.3.4 Preparing teachers for a 1:1 program.....	18
CHAPTER 3 – METHODOLOGY.....	20
3.1 RESEARCH APPROACH.....	20
3.2 RESEARCHER POSITIONING.....	21
3.3 CASE STUDY.....	22
3.4 CONTEXT OF THE STUDY LOCATION.....	25
3.5 PARTICIPANT SELECTION.....	28

3.6 DATA COLLECTION	28
3.6.1 Phase I – Questionnaire	29
3.6.2 Phase II – Observations and Interviews	30
3.7 DATA ANALYSIS METHODS	32
3.8 ETHICAL CONSIDERATIONS	34
CHAPTER 4 – PROFESSIONAL LEARNING.....	37
4.1 BACKGROUND.....	38
4.2 PLANNING FOR QUALITY PROFESSIONAL LEARNING	40
4.3 PROFESSIONAL DISCUSSION AND CONVERSATION	45
4.4 IMPLICATIONS FOR PROFESSIONAL LEARNING	47
CHAPTER 5 – THE TEACHER AND THE 1:1 PROGRAM	50
5.1 INITIAL THOUGHTS 1:1 IPAD TRIAL	50
5.1.1 The Concerns.....	51
5.1.2 Potential opportunities of the 1:1 program.....	54
5.2 TEACHER WORKLOAD.....	56
5.2.1 Communication with Students.....	56
5.2.2 Curriculum Preparation.....	57
5.2.3 Pressure on curriculum time.....	58
5.2.4 Professional Learning	60
5.3 CLASSROOM MANAGEMENT.....	61
CHAPTER 6 – TECHNICAL IMPLICATIONS OF 1:1 IPAD PROGRAMS IN SCHOOLS.....	63
6.1 TECHNICAL ASPECTS OF THE IPAD.....	63
6.1.1 What worked well with the iPad	63
6.1.2 What the iPad could do better.....	65
6.2 SUPPORTING INFRASTRUCTURE	66
CHAPTER 7 – CONCLUSION	69
7.1 QUESTIONS ADDRESSED IN THE STUDY.....	69
7.1.1 Question 1 – What advantages and/or challenges do teachers experience when using iPads in middle school classrooms?.....	69

7.1.2 Question 2 – What do teachers think about the integration of ipads into their classrooms?	70
7.1.3 Question 3 – What is the relationship between ipad technology and the intended curriculum in these classrooms?	71
7.2 LIMITATIONS OF THIS STUDY, CONTRIBUTIONS TO EXISTING RESEARCH SUGGESTIONS FOR FUTURE RESEARCH	72
7.3 CONCLUDING STATEMENT	73
REFERENCES.....	75
APPENDICES.....	80
APPENDIX 1 – INITIAL QUESTIONNAIRE.....	81
APPENDIX 2 – INTERVIEW QUESTIONS	82
APPENDIX 3 – ANNE’S INTERVIEW TRANSCRIPT	83
APPENDIX 4 – PARTICIPANT BIOGRAPHIES	91

LIST OF TABLES

Table 2.1: Stages of technological domestication	11
Table 3.1: Campuses of Castle College	25
Table 3.2: Participants of the study.....	28
Table 3.3: Data Analysis process used in this study	34
Table 3.4: Processes implemented to reduce potential conflict of interest	35
Table 3.5: Processes implemented to reduce potential bias	36
Table 4.1: Professional learning undertaken by study participants	39
Table 4.2: Key findings and related guidelines from the National Mapping of Teacher Professional Learning Project	41
Table 4.3: Recommendations for effective professional learning	49

LIST OF FIGURES

Figure 3.1: Data Analysis Spiral	33
--	----

COPYRIGHT NOTICES

Notice 1

Under the Copyright Act 1968, this thesis must be used only under the normal conditions of scholarly fair dealing. In particular no results or conclusions should be extracted from it, nor should it be copied or closely paraphrased in whole or in part without the written consent of the author. Proper written acknowledgement should be made for any assistance obtained from this thesis.

Notice 2

I certify that I have made all reasonable efforts to secure copyright permissions for third-party content included in this thesis and have not knowingly added copyright content to my work without the owner's permission.

DECLARATIONS

I, Craig Nicholls, hereby declare that this thesis contains no material that has been accepted for the award of any other degree or diploma in any educational institution and, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed: Date:

This research project received the approval of the Monash University Standing Committee for Ethical Research on Humans (MUHREC). (Project: CF11/2056 - 2011001154)

ACKNOWLEDGMENTS

This study would not have been possible without the gracious participation of the six educators who are the focus. I appreciate their willingness to freely give of their time as part of this investigation. Thanks also go to the Castle College administrators who permitted this research to take place at the Country campus and Dr. Scott Bulfin who has guided me throughout this process. Finally, to Dona, Caiden and Alex, thank you for your patience, support and understanding during this process. Thank you for giving me the courage and resilience to complete this when things got complicated. Without you being there for me this document would never have been completed.

CHAPTER 1 – INTRODUCTION

Since the introduction of various information and communication technologies (ICT) into schools and classrooms, the issue of access to these resources has been a source of concern to teachers and school administrators. As the cost of some computer technologies has decreased, many educational institutions have been able to improve their computer-to-student ratios (Grimes & Warschauer, 2008). Educational institutions around the globe have invested large amounts of money and time into the exploration and implementation of a vast range of technology programs. This research study has been concerned with a small subset of these programs: so called ‘1:1’ initiatives and programs. Examples of 1:1 programs include the ‘Apple Classrooms of Tomorrow’ (ACoT) project (Donovan, Hartley, & Strudler, 2007) from the 1980s and Microsoft’s ‘Anywhere Anytime Learning’ (New South Wales Department of Education and Training (NSWDET), 2009; Donovan et al., 2007). Since the release of the first Apple iPad in 2010, numerous 1:1 iPad ‘trials’ and programs have been implemented both in Australia and internationally (Brice, 2011; Department of Education and Early Childhood Development (DEECD), 2011; Northern Territory Department of Education and Training (NTDET), 2011; Queensland Department of Education and Training (QLDDET), 2011).

Features of 1:1 programs can vary, but are typified by each student and teacher having individual access to his or her own computer or digital device. Devices are often loaded with software (such as word processing and multimedia creation tools), and are internet access enabled through a wireless network and have a long life battery (NSWDET, 2009).

The ACoT project was a longitudinal study of one of the first 1:1 programs in the world, running from 1985 to 1995. The original aim of the program was to ‘investigate what happens to students and teachers when they have access to technology whenever they need it’ (Dwyer, 1995, p. 4). Students and teachers received two computers – one for school and one for home – and, overtime, curriculum was developed that made use of the technology. By the mid-1990s, laptops largely replaced desktop computers in 1:1 programs, but the goal of providing ‘instant access’ to resources remained. Prominent local programs in Victorian schools at the time included Frankston High School and Methodist Ladies College (Riekert & Timson, 2006).

As the cost of technology decreased, 1:1 programs became more prevalent and expansive. One of the higher profile programs, the Maine Learning Technology Initiative (MLTI), began in September 2002 and involved all 7th and 8th grade students in the State receiving laptops and using them in daily classes (Silvernail & Gritter, 2007). In the years following, this program was expanded to include all students from the 7th grade to the 12th grade in the state (<http://maine.gov/mlti/>).

The first generation iPad was released in April, 2010 (Apple Inc., 2010). By 2011, Government education departments across Australia were running school-based trials of the technology to explore its suitability for education (Brice, 2011; DEECD, 2011; NTDET, 2011; QLDDDET, 2011). It is in this environment that Castle College undertook a 1:1 iPad trial at the commencement of the 2012 school year.

While the research into the use of iPads in educational settings is still in its infancy, research into 1:1 technological initiatives is more extensive, having been in place for over 20 years. Throughout this thesis, parallels are drawn between conclusions about 1:1 programs in general, and also specific 1:1 iPad programs. The body of research into 1:1 programs is largely focused on improvements – or lack thereof – in the academic performance of the students involved in such programs (see 2.3.3). This is a point of difference for the study this thesis is reporting on.

1.1 AIMS OF THE RESEARCH

This study was focused on the experiences of a group of teachers within the initial stages of a 1:1 iPad program. It aimed to develop a better understanding of teachers' attitudes towards the use of iPads in their classrooms and their experiences working in a 1:1 environment. During the initial stages of investigation, it became apparent that research already existed into how technology and 1:1 programs influence both student engagement (see Bennett et al., 2008; NSWDET, 2009; Gawelek, 2011; Larkin, 2011; Muspratt & Freebody, 2008; NSW, 2010; Spires, Lee, Turner, & Johnson, 2008) and academic results (see Barrios et al., 2004; Caldwell, 1980; Garner, 2012; Grimes & Warschauer, 2008; Hu, 2007; Lemke, Coughlin, & Reifsneider, 2009; NSW, 2010). However, there appeared to be little research into how such programs influence the daily working life of middle school teachers.

The introduction of a 1:1 program of any kind represents a pedagogical shift for the majority of educators. Existing research claims that such programs can improve student engagement (NSWDET, 2009) and academic results (NSW, 2010). However, questions

about the impact on teachers delivering these programs do not appear to have been adequately investigated. In response to this lack of research, this thesis describes and analyses how the introduction of a 1:1 iPad program affected aspects of the daily working life of a group of middle school teachers.

1.2 CONTEXT OF THE STUDY

The study reported in this thesis followed the experiences of six middle school teachers (Years 5 to 8) through the initial stages of an extensive 1:1 iPad trial at Castle College, an independent school in the south-east of Melbourne, Victoria. The iPad trial took place in 2012. The study set out to develop an improved understanding of how the introduction of a 1:1 iPad program influences the working life of middle school teachers. It investigated both the advantages and challenges that teachers face in this situation and explored teacher opinion about such programs. The contextual information outlined below has been developed from the knowledge and understanding of Castle College that I have gained through working in this institution.

Castle College is a large, multi-campus, independent school located in the fast-growing, south-eastern suburbs of Melbourne. At the time of the study, approximately 3,600 students were enrolled at the school, across four campuses. The school employs approximately 450 teaching staff and has a long tradition of private boys' education. It has recently become co-educational in some of its programs, particularly in the early/kindergarten and primary school years. Boys and girls are together in the three and four year old 'Early Learning Centre' (ELC) and from 'Prep' (first year of school) to Year 4. From Year 5 through to the end of secondary school, boys and girls are split into single-sex classes. The school prides itself on academic excellence and a commitment to social justice. Castle College strives to be recognised as a great world school.

Castle College has a mixed history in relation to the use of technology. Negatives include technological infrastructure that could, occasionally, be found wanting. Prior to the 2012 iPad trial, the majority of classrooms throughout Castle College were each fitted with four Microsoft Windows desktop computers. These computers were mainly used for internet searching or publishing work. In 2009, a major upgrade of the network took place, increasing network reliability and performance. However, the wireless network was not given priority as part of the upgrade. Prior to the iPad trial, some areas of the school used the learning management system, 'Blackboard', effectively – others did not use it at all. These negatives contributed to a reluctance in embracing technology by

many of the teaching staff. Both staff and school leadership identified the need for change in this area. At the time of the study each campus had a Director of Learning Technology who was responsible for the development of the learning technology skills of the staff at that campus. Directors at each campus were assigned two-and-a-half days per week for this role.

In 2011, the leadership team of Castle College decided to conduct a trial into the 'effective use of iPads in the classroom'. This trial ran throughout 2012 and involved approximately 700 students and their teachers, totalling almost 900 participants. The majority of the staff and students involved in the trial were in Years 5 to 11 at Castle College's Country campus. Year 9 staff and students from the Bayside and Southern campuses also participated. The final group in the trial were International Baccalaureate (IB) students and their teachers from the Senior campus. Key to this trial was the belief that the iPad should be used as a tool to support learning in the classroom and not as a replacement for pen and paper. In 2013, the 1:1 iPad trial became a full program with all staff and students from Years 5 to 12 – at all four campuses – working with iPads in a 1:1 environment. While the trial was implemented using school-owned iPads, it was decided by school leadership to move to a student-owned model with the expansion into the full program.

The six teacher participants in this study – Mary, Liz, Anne, Henry, Charles and William – were all middle school teachers at the Country campus of Castle College throughout 2012. They represented a variety of curriculum areas, including: drama, English, humanities, maths, music and science.

1.3 RESEARCH QUESTIONS

There are three research questions central to this study. The original intent of this research project was to investigate how the introduction of a 1:1 iPad program changes the teaching day for educators. Given this intent, it was important to explore what experiences teachers saw as advantageous and what experiences they saw as challenges when working in a 1:1 iPad environment. To this end, the first of the research questions was developed:

What advantages and/or challenges do teachers experience when using iPads in middle school classrooms?
--

It was also decided early in the study that there should be a strong teacher voice throughout the project and thesis; the study is about teacher experiences and should be told from a teacher's point of view where possible. Therefore, a research question asking for an opinion about iPad integration resulted:

What do teachers think about the integration of iPads into their classrooms?

In an ideal world – and with unlimited time and word limits – this study would have investigated teachers' technological self-efficacy and other factors that limit teacher take-up of technology. These issues would complement this study. However, when prioritising the focus for this study, it was decided that, given the work of others in this area (see Hall & Hord, 1987), it would be better to focus on the lesser-researched links between the iPad device and the curriculum within which it will be integrated:

What is the relationship between iPad technology and the intended curriculum in these classrooms?

This final research question focuses on how the participants in the study are utilising iPads in their classrooms. The investigation of this relationship provides a strong teacher voice; looking at more than just what iPads can do by investigating the tension between this introducing the technology to the classroom and competing pressures, such as a crowded curriculum.

1.4 STRUCTURE OF THE THESIS

The thesis is organised into seven chapters. After this introductory chapter, a Review of Theory and Research (see Chapter 2) argues that, while technological determinism has strong support within academia, I find social shaping theories and the domestication of technology to be more palatable, especially within the confines of this research. Looking at a new technology as something that is tamed and then integrated by the user, is similar to the experiences of the participants in this study. Existing research into 1:1 laptop and digital device programs is also discussed, arguing that attributing improvements in academic achievement to the implementation of a 1:1 technological program is, perhaps, unrealistic. The final part of this review focuses on the importance of adequately preparing teaching staff for the implementation of a 1:1 technological program.

Chapter 3 outlines the study's research methodology and argues that a constructivist paradigm allows me, the researcher, to build understandings from the experiences of the participants. This chapter also provides an opportunity to discuss the tension created by my dual role as researcher and as an employee of Castle College working with the study participants on a daily basis.

Chapters 4, 5 and 6 involve the presentation and discussion of results. The importance of professional learning as part of the implementation of a 1:1 iPad trial, is outlined in Chapter 4. The chapter concludes with the recommendation that opportunities for professional learning should be available when required by the teacher and be in a format that suits their learning style and targeted to their ability level.

Chapter 5 discusses how the introduction of a 1:1 program altered the work life of the participants. Unsurprisingly the introduction of a 1:1 iPad program changed teachers' daily routines, and there were some concerns from the participants about these changes. Most concerns seemed founded on a fear of the unknown, for example, would there be a loss of curriculum time and would students spend more time off-task? While there were some concerns, there was also an acknowledgement of the trial's potential; for example, increased access to online resources. When looking at the working life of a teacher, workload is important. With the introduction of the iPad trial came an increased workload for the participants. At first glance, such an increase could be seen as a negative. However, almost all the participants reported that the benefits for the students resulting from the increased workload were worth the additional imposition.

Chapter 6 discusses the suitability of the iPad for the classrooms of the participant teachers. It highlights the technical infrastructure that is required to make the iPad an effective device and the strengths and weaknesses of the actual device, as seen by the participants.

Chapter 7 completes the thesis with a series of conclusions and recommendations for future implementations of 1:1 programs in schools.

CHAPTER 2 – REVIEW OF THEORY AND RESEARCH

2.1 INTRODUCTION

This review of theory and research is divided into two main sections. In the first, I explore conceptual territory by discussing technological determinism (see 2.2.1) and the value of social shaping theories of technology (see 2.2.2), reviewing how these are applied to the project, before explaining why domestication theory is most appropriate for this study (see 2.2.3). In the final section of this chapter (2.3), I review research on 1:1 laptop/digital device programs within various educational settings so that it is possible to see where this study sits in the research landscape. Topics covered in this chapter include: the advent of 1:1 iPad programs (see 2.3.1), a brief history of other 1:1 programs (see 2.3.2), the academic impact of 1:1 programs (see 2.3.3) and the need for appropriate staff training when implementing a 1:1 program (see 2.3.4).

2.2 TECHNOLOGICAL DETERMINISM VERSUS SOCIAL SHAPING THEORIES

While preparing for the study, it became apparent that two very different approaches to the development and use of educational technology existed. This became more evident when deciding on a theoretical framework for the study. In this study, I explored how social shaping theories – in particular, the domestication of technology – can be used to support the planning and implementation of professional development for educators during the implementation of a technological initiative. To this end, I have included this section as part of the Review of Theory and Research.

This section of the review is devoted to comparing technological determinism and anti-deterministic approaches, such as social shaping theory (Grint & Woolgar, 1997). To simplify this comparison, the following question has been used as a starting point:

Does technology drive change within society or do organisational, political, economic and cultural factors manipulate the design and implementation of technology?
--

To answer this question, the opposing points of view are explored in the remainder of this section.

2.2.1 TECHNOLOGICAL DETERMINISM

Technological determinism gives us a framework of explication that ties together the background forces of our civilisation in which technology looms as an immense presence, with the foreground problem of the continuously evolving social order in which we live. The tie between the two is far from definitive, complete or unambiguous, but it is the only such connection that we can make. (Heilbroner, 1994)

Technological determinism is a perspective which sees technology as a driving force behind any change within a society, including changes in school education and learning (Chander, 1995; Heilbroner, 1967, 1994; Oliver, 2011; Pinch & Bijker, 1987; Selwyn, 2011; Smith & Marx, 1994). Technological determinism is often broken into a 'hard' or 'soft' stance. Supporters of soft technological determinism believe that technology is one of the forces that drive change within society, while those with a hard view believe that technology is the major or only force shaping our society (Adler, 2008; Bimber, 1994).

Technological determinism is not a new phenomenon or belief. Over 2000 years ago, Plato employed a technological deterministic point of view when he wrote that: 'Those who acquire [writing] will cease to exercise their memory and become forgetful; they will rely on writing to bring things to their remembrance by external signs instead of on their own internal resources' (Plato, 1973, p. 96). Society's concept of what technology is may have changed, but the prospect of introducing iPads into a classroom in 2012 can elicit a similar response from some, mirroring the concerns about the proliferation of writing in c. 370 BC. Both of these 'new things' embody the potential to change the processes and routines of existing constructs. In 370 BC, it was feared that writing was going to weaken the memory. Similarly in 2012, some people feared that using iPads in classrooms would reduce students' ability to write.

One of the cornerstones of a technological determinist view is Heilbroner's 1967 essay, 'Do Machines Make History?' This text sets out to prove the Marxian statement: 'The hand-mill gives you society with the feudal lord; the steam mill, society with the industrial capitalist'. He suggests a hard deterministic outlook is required in which technological developments must pass through a linear development process in order to fulfil their potential. To support this linear and orderly idea of technological development, Heilbroner cites the simultaneity of invention, the absence of technological leaps and the predictability of technology (Heilbroner, 1967). Tracking the development of technology backwards, it does appear to support a *prima facie*

logical sequence. However, is passing through this wonderfully logical sequence of developmental stages alone, enough to bring about the next stage? Many technologies have had missteps along their developmental journey; the development of video devices and formats may appear to be linear at first glance. However, throughout its evolution, there have been battles fought before one format triumphed over the others. Such battles are not fought with weapons, but rather, through choices and decisions made by organisations, consumers and public perception. Betamax, Video CD and LaserDisc technologies are all victims of these battles. Sometimes, missteps with technological advancements occur so that lessons can be learnt and improvements made. It can be argued that Apple's misstep with the Newton PDA in 1993 was beneficial to the development of hand held computing and necessary for the development of current iOS devices. At other times, the winners of the battle for technological survival are decided by political jostling behind the scenes that consumers are not privy to. This is one factor that can make technological development non-linear.

Technological determinists can appear to have a somewhat pessimistic view of the world. Concerns for the future of humanity are often couched in terms of technology continually and autonomously evolving to become an independent beast (Ellul, 1962; Mumford, 1972; Smith & Marx, 1994). For example, Mumford argues that:

Man will become a passive, purposeless, machine-conditioned animal whose proper functions, as technicians now interpret man's role, will either be fed into the machine or strictly limited and controlled for the benefit of de-personalised, collective organisations. (Mumford, 1972)

Do we now live in a society that has a predetermined direction driven by our extensive technological reliance? Is a school now implementing a 1:1 iPad program bound to a predetermined educational direction? Hard technological determinists such as Ellul would argue, 'Yes!' Or, alternatively, as Grint and Woolgar (1997) claim, is the nature, form and capacity of a technology the result of various antecedent circumstances involved in its development? This point of view is addressed in the following sub-section.

2.2.2 SOCIAL SHAPING THEORIES

The technological deterministic claim, that the technological direction that our society takes is predetermined or shaped by technological development and not affected by

social choices, is seen as somewhat strange by some, myself included. An anti-essentialist viewpoint is best summed up by Grint and Woolgar (1997), who note:

What a machine is, what it will do, what its effects will be, are the upshot of specific readings of the text rather than arising directly from the essence of an unmediated or self-explanatory technology. (Grint & Woolgar, 1997, p. 32)

Furthermore, Grint and Woolgar argue that 'technology does not speak for itself but has to be spoken for' (Grint & Woolgar, 1997, p. 32).

Social shaping theories put the development of technology firmly back into the hands of the society it is embedded in. Social shaping theories highlight how society and its needs drive the development of technology. They are based on the idea that the actions of different groups within any community have an impact on the development and use of technology within that community. Williams and Edge (1996), for example, suggest that 'technology does not develop according to an inner technical logic but is instead a social product, patterned by the conditions of its creation and use' (Williams & Edge, 1996, p. 857). Social shaping theory proponents believe that the choices made during the design of different technologies and systems – and in its use – shape the direction of future innovations and development. Social shaping theory presents the visual metaphor of a garden of forking paths, each with a choice that will direct the development of technologies within a society. These choices are not always conscious, but they do impact different social groups in different ways (MacKenzie & Wajcman, 1999; Selwyn, 2011; Williams & Edge, 1996). It is these choices, which are made about the usage of technology, that are of relevance to this study.

In the current context – a school running a 1:1 iPad trial – the device is brought in and leadership will, hopefully, decide how they want the device to be used within the school. The teachers will then take the iPad and make choices about how it works well for them; each teacher may make a slightly different choice but, as a group, there will be choices made. Next, the students will use the technology and the choices they make will decide how they will use the iPad while at school. Between these three, different groups, there may be some tension and division about how the iPad should be used, but ultimately, through negotiation or the power of one group, a structure or format for the use of iPads during classtime will be developed by the group.

2.2.3 DOMESTICATION OF TECHNOLOGY THEORY

Under the social shaping theory umbrella, is the domestication of technology approach. In this theory, new technology is almost seen as an untamed beast that is prone to uncontrollable outbursts. The technology must be domesticated so that it can exist alongside mankind (Haddon, 2006; Silverstone, 1994; Silverstone & Haddon, 1996; Silverstone, Hirsch, & Morley, 1992). This branch of social shaping theory outlines how a society takes a technological advancement and adapts, copes and even trains it to be what they want – much like we would a new pet that we bring into our homes. The domestication of technology can be broken into four stages: appropriation, objectification, incorporation and conversion (see Table 2.1).

Stages of Technological Domestication	Description
Appropriation	Appropriation is the act of acquiring the technology; it is new and shiny and the user may or may not be excited about the latest addition to their life. It is in this stage that the technology is at its 'wildest'.
Objectification	During the objectification stage, the user explores with the technology and makes choices about how it will impact on their life. This is almost a 'getting to know you' phase. Trial and error will occur as the user decides how the technology will or will not be used on a daily basis.
Incorporation	In the incorporation stage, the user will ultimately make the decision about the long term viability of the technology. They are familiar with the usability of the technology and have reached a point where they can decide what impact this new technology will have on their life.
Conversion	During the conversion stage, the user comes to a point where the technology is almost taken for granted. At this time, the user has decided how they will use the technology – this may or may not be how it was intended initially, but it works how the user needs it to

TABLE 2.1: STAGES OF TECHNOLOGICAL DOMESTICATION (SIVERSTONE ET AL., 1992).

In the case of this study, the technology in question is the iPad and the environment is a classroom. The participants (educators) will 'go through' the four stages of domestication of technology with varying rates of success and failure. This is not a linear model. There are issues along the way that must be dealt with; backward steps that make the use of the iPad more or less successful. This alone makes domestication of technology an approach that is not technologically deterministic. However, is the domestication of the iPad in a school environment one that can be defined through a

social shaping theory? It is not a process where the whole community decided on the initial design or adoption of the device, but – and this is the important part – the school community has influenced how the device is used within the classroom. Heilbroner and his peers would argue that the domestication of technology is a flawed theory due to the influence that society has on the development and implementation of the technology. It is this influence, however, that makes the domestication of technology theory a social shaping theory that sits well with the study.

This returns the discussion to the question that began this section: ‘Does technology drive change within society or do organisational, political, economic and cultural factors manipulate the design and implementation of a technology?’ To claim that technology is almost self-determining and impervious to what is occurring in the broader society is a stretch that I am unwilling to make, at this time. However, to take the Social Shaping Theory viewpoint that organisational, political, economic and cultural factors manipulate the design and implementation of a technology, can also be problematic. As previously stated, the domestication of technology theory is one that sits well with me. Utilising this theory in this study will facilitate the signposting of the different stages of iPad use by the participants.

2.3 1:1 PROGRAMS WITHIN SCHOOLS

Since the introduction of 1:1 programs some 25 years ago, much has been written about them – both positive and negative. The sheer number of 1:1 programs worldwide can be seen as a kind of public ‘tick of approval’. However, questions still need to be raised about their effectiveness in terms of increasing student achievement. The main feature of these programs is that each student has immediate access to technology in the classroom. There are two main streams of 1:1 programs, the first being the plethora of laptop programs that have been running worldwide since the mid-1990s; the second is the more recent implementations of ‘handheld computing’ programs that are currently being trialled and explored (for example, mobile phones, iPads and other tablets). The history of these programs, including the academic impact and the need to adequately prepare teaching staff, is explored in the next sub-section.

2.3.1 1:1 IPAD PROGRAMS

The Apple iPad has quickly ingrained itself in popular culture with sales of approximately 3.27 million in the first two months after its April 2010 release (Apple

Inc., 2010). In the last quarter of 2011, 15.4 million iPads were sold. These sales bring the total number of iPads sold, by the end of 2011 (just before the commencement of the 2012 iPad trial at Castle College), to approximately 55 million (Elmer-DeWitt, 2012; Gustin, 2012). The education market has been quick to see the potential of this device and its predecessors (Brice, 2011), implementing trials and tests to explore the value of this technology (Brice, 2011; DEECD, 2011; NTDET, 2011; QLDDDET, 2011). While this may be a reflection of the product, it may also be a reflection of a successful marketing campaign and how these devices have ingrained themselves in popular culture.

Research into the use of iPads in the classroom is relatively new as the device has only been available since mid-2010. Murray and Olcese (2011) began their research into the potential of use of iPads (and related apps) not long after the first iPad was sold. Their findings indicated that the suitability of this technology is limited in the classroom environment. The main reason cited is that the education apps used in the study did not maximise the technology's potential. The weakness of this study is the focus on the technical aspects of the iPad and related apps, there was a limited amount of research and discussion into the pedagogical ramifications of using iPads in a classroom. Other early studies, such as Gawelek (2011), had an increased focus on the teaching and learning that can be assisted by the iPad. Gawelek found that the use of iPads created an environment where students were able to not only access information quickly and easily, but they were also encouraged to create content to demonstrate their understanding. While this finding can be seen as a positive the infancy of this study, and Murry and Olcese's work, highlights the need for further, formal investigation and assessment of the use of iOS technology in an educational setting.

In 2011, in Australia, the Queensland government commissioned a report into the suitability of iPads in the school environment. Results showed that the iPad is an ideal cross curricula device; not restricted to one curriculum area due to the large numbers of inexpensive apps that are available for use in the classroom (QLDDDET, 2011). Similar trials run by the Northern Territory and Victorian governments, have reported positive initial findings, with the iPad found to be an 'engaging tool that can be used as part of a tool kit for teaching and learning' and allowing students to take 'greater control of their learning, practicing specific skills with selected apps to improve their learning, and extending learning beyond the classroom' (The Royal Children's Hospital Melbourne (RCH), 2012, Findings section). The Victorian trial is currently ongoing and involves over 700 iPads across ten K-12 locations. The trial aims to investigate the impact these devices have on all members of the educational community (DEECD, 2011; NTDET,

2011). These government run trials vary in size and scope and while they produced some positive results it is important to recognise the issues such as device management and infrastructure requirements, this is something these findings tended to gloss over. Cauchi (2011), while acknowledging the enthusiastic uptake of these devices in the Victorian trial schools, questions the effectiveness of these devices when compared to laptops, as educational experts were yet to be convinced about the educational effectiveness of the iPad. This is a valid concern and it reinforces the need for further formal investigation into the use of iPads in schools.

2.3.2 A BRIEF HISTORY OF 1:1 PROGRAMS

1:1 programs are usually based on goals that focus on improving student access to information and utilising technology to improve student learning outcomes. Common goals include:

1. Creating a better-educated work force, thereby enabling greater 'productivity';
2. Providing students from lower socio-economic backgrounds with increased access to technology to ensure that they have similar access to information as do their more affluent peers; and
3. Education reform. Creating schools that 'meet the needs of technology rich society' (NSWDET, 2009; Lemke et al., 2009).

Since the introduction of ICT into classrooms, the issue of access has been a source of concern to teachers. As the cost of technology has decreased, educational institutions have been able to improve their computer-to-student ratios (Grimes & Warschauer, 2008). 1:1 laptop programs in Australia are not new. Victorian schools, such as Methodist Ladies College and Frankston High School, have been developing and implementing these programs since the mid-1990s (Riekert & Timson, 2006). Similar programs and trials exist internationally in varying forms. Larger scale examples of these include the Apple Classrooms of Tomorrow (ACoT) from the 1980s and Microsoft's Anywhere Anytime Learning (NSWDET, 2009; Donovan et al., 2007). In the Australian context, recent years have seen an increase in the computer-to-student ratio – including a large number of 1:1 laptop programs – made possible by funding from the Australian Government's Digital Education Revolution (DER) (Department of Education, Employment and Workplace Relations (DEEWR), 2008). The funding model for 1:1 programs is a contentious issue. The source or structure of funding can change over time and this has a substantial impact on the ongoing viability of such programs.

While considering funding it is important to take setup costs into account. A mobile device of any kind has limited use if the wireless network it connects to is not robust enough to handle the traffic that multiple devices create.

2.3.3 THE ACADEMIC IMPACT OF 1:1 PROGRAMS

There have been some concerns expressed about the lack of academic rigor that research into 1:1 programs in the early to mid-2000s appear to contain. It is important to keep this in mind and temper the positive results that many of these programs have achieved (Grimes & Warschauer, 2008; Lemke et al., 2009). Several reports have found the non-academic benefits of 1:1 programs to be extensive and valuable. 1:1 laptop programs provide students with opportunities to access information and conduct research online to support 'just in time' learning (NSWDET, 2009, p. 11). Teacher and student opinions about using laptops within the classroom are overwhelmingly positive (NSWDET, 2009, p. 10; Grimes & Warschauer, 2008, pp. 322-344). The majority of both staff and students would recommend that other schools use laptops on a daily basis (NSWDET, 2009, p. 10; Grimes & Warschauer, 2008, pp. 322-344). Staff also reported an increase in student motivation and focus when the laptops were used appropriately (NSWDET, 2009; Holcomb, 2009). Students found that using laptops helped to keep themselves organised and made it easier to edit their work (Holcomb, 2009, p. 49).

One major concern with studies into 1:1 programs in education has been how to definitively argue that any improvement in student results can be attributed to the introduction of a laptop program into the school. In their study of the implementation of a 1:1 laptop program, Grimes and Warschauer (2008) hypothesised that there would be an initial decline in results during the first year of a laptop program due to the need to teach students how to use the technology. The hypothesis then stated that the following year, student results would improve and hopefully surpass the starting point. In actuality, while student results did decline and improve as expected, it was noted that there were a number of additional variables; including a change in teaching styles to accommodate the laptops and a change in leadership at one of the schools. Social shaping theory suggests that a change in teaching style is something that would seem to go hand in hand with the introduction of a 1:1 program. The technology does not influence any change in teaching strategy, instead choices are made by educators about how they will change their classroom approaches to best utilise the technology. These variables could have explained the changes in student performance. This leads to questioning the validity of attributing improvements in academic achievement to one

single factor, such as the introduction of 1:1 programs. Conversely, questioning if this benchmark is a valid one to use when measuring the success of such programs is of equal importance.

Exploring this idea further, the NSW Department of Education and Training's 2009 review in this area found that of the numerous studies into the use of laptops in the classroom only a few reported statistical improvements in grades. However, a summary of a range of studies noted positive outcomes, including that students:

- write more extensively with improved quality;
- have increased engagement in learning;
- are more interested in learning;
- focus on improving their performance;
- work collaboratively, as they are more willing to share their work and help each other engage more in self-directed learning;
- have greater self-confidence and self-esteem;
- have greater ICT skills;
- improve their research skills;
- are more enthusiastic and have fun learning;
- improve problem solving and critical thinking skills;
- are engaged in more project-based work; and
- enjoy learning actively. (DET, 2009)

These are not all high level academic outcomes, but are skills and attitudes that many teachers would like their students to develop. Upon further investigation it became clear that a number of studies covered by the NSW review collected data in the form of student opinion. Students may believe that their research skills have improved due to the use of laptops, but this does not make it so. These outcomes could be used to build a different measure of the success of a 1:1 program. This is an area that could warrant further, separate investigation as it is outside the scope of this study.

Social shaping suggests that each community will make their own choices about how a technology is used (MacKenzie & Wajcman, 1999). This is one explanation for the range of positive outcomes reported in this study; each school community will have made their own choices about how they implemented a 1: program. These choices influence the outcomes that the studies achieved.

Twelve months later, a further review of the literature by the same organisation – on this occasion with a heavier focus on student achievement in 1:1 laptop programs – found that there were improvements in standardised test results, especially in the area of writing, in schools that had implemented 1:1 laptop programs (NSW, 2010). Holcomb (2009) reported that results in standardised testing from a wide range of laptop programs were improving when compared to non-laptop schools. Longer-running, larger programs, such as the Maine Learning Technology Initiative (MLTI), have produced positive results when compared to similar schools that are not running a 1:1 laptop program. In one example, the MLTI produced significant improvements, over three years, in eighth grade writing standardised testing, when compared to non 1:1 schools (Silvernail & Gritter, 2007). Moreover, a student who used their laptop during all phases of the writing process, performed better than 75% of students who chose not to use the laptop during any phase of the writing process.

While some of these research findings offer promise, a number of other studies have not been as hopeful. Garner (2012), Hu (2007) and Warschauer (2006) all discussed several significant U.S. based laptop programs that failed to produce significant academic improvements compared to non-laptop schools. Garner related these results to the importance of properly aligning and integrating the technology with – and into – the curriculum. Warschauer focused on the impact socio-economic backgrounds have on the success of laptop programs. He found that students from higher socio-economic backgrounds were more likely to be expected, prepared and encouraged to continue onto further education. The long-term effect of this expectation contributes to the students possessing the critical and analytical skills necessary to succeed in such programs. Conversely, students who do not live in a supportive home environment, often lack the necessary skills.

The impact of iPads on academic achievement is still being debated amongst the academic community. Melbourne University's Trinity College reports that the students involved in its 2011 iPad trial (10% of the cohort) produced the highest individual scores of the group and the cohort produced higher average scores than their peers (Jennings, 2012). On face value, these results are good, but it is important to note that the iPad cohort was made up entirely of students who started their studies in August, while the remainder began in February (TrinityCollege, 2011). While the results of this cohort are encouraging, it is difficult to conclusively attribute the positive results to the use of iPads alone, when the students involved experienced approximately 30% more

time in class. This is another example of where an alternate form of assessing the success of a 1:1 trial could be useful.

It is critical to explore what these mixed results and programs mean for teachers. It can be argued that the primary function of a teacher is to educate and, therefore, help students fulfil their academic potential. This review of literature has shown a divergence of opinion about the academic impact of 1:1 programs; some studies claim they do have an impact and some claim they do not. When it is considered that technology has been shown to increase student engagement and motivation, then it can be reasonably argued that this could have a flow-on effect to an improvement in grades (Department of Science and Training (DEST), 2005). One theme that has been consistent throughout most of the literature is that it is very difficult to attribute any gains in student performance to the use of technology. Some studies have made this claim (Holcomb, 2009; Jennings, 2012; Silvernail & Gritter, 2007; TrinityCollege, 2011). However, there are many factors that impact academic achievement and pinning these improvements on one of these factors can be a mistake. Introducing a 1:1 program is not a panacea for poor achieving students. A high performing teacher that uses no technology is more likely to have high achieving students than a low performing teacher who uses technology.

The strategies used to measure the success of a newly introduced 1:1 iPad trial may cause concern to staff in a school that has a strong academic focus such as Castle College. The variety of potential benefits discussed in this section may or may not manifest into an improvement in academic results and this manifestation may take longer than the time allotted for the trial. These concerns are further investigated and discussed in Chapter 5.

At a daily, operational level, it is important that teachers carefully consider how they utilise the increased availability of technology in their classrooms (Banister, 2010; Brice, 2011; Collins & Halverson, 2009; Dunleavy, Dexter, & Heinecke, 2007). The pedagogical approach teachers use when integrating technology is a factor on the academic results achieved by students. This is where professional development and learning has a role to play.

2.3.4 PREPARING TEACHERS FOR A 1:1 PROGRAM

One important lesson that can be learnt from the implementation of 1:1 laptop programs and the mixed findings is the need for appropriate, subject-based, curriculum

integration training for staff (Barrios et al., 2004; Donovan et al., 2007; Grimes & Warschauer, 2008; Holcomb, 2009; Hu, 2007). Both Foote (2012) and the QLDDET (2011) argue that this should be a key consideration when planning for a 1:1 iPad program. Foote muses:

Will the iPad's portability, ability to be personalised, and functionality impact its effectiveness in a school setting? In answering this question, so much depends on the purposes for which it is intended; the pedagogy accompanying its use; training afforded to teachers; the methods for implementing the new technology; and the tech support provided. (Foote, 2012, p. 15)

Grimes and Warschauer (2008) found that simply providing laptops – or another mobile device – to staff and students is not enough to maximise the opportunity created by a 1:1 program. Holcomb (2009) continued with the notion of training staff how to use a variety of applications also not being enough. Other studies also recognised the importance of appropriate pedagogically based training for staff on how to successfully integrate laptops into their daily teaching (Barrios et al., 2004; Donovan et al., 2007; QLDDET, 2011). Hu (2007) found that failure to do this can contribute to the lack of meaningful work done by students when using the laptops and, therefore, lead to school administrators abandoning the use of laptops in their schools. It appears that educational institutions that provide staff with appropriate technical, professional development, as well as curriculum-based professional development, have a far greater chance of staff using laptops in meaningful ways with their students (Bebell, Russell, & O'Dwyer, 2004; Hall, 2010).

How effective have these 1:1 programs been? Have they been worth the investment? To answer these questions it is important to note that the answers are dependent on the goals of each individual program. As previously noted (see 2.3.3), social shaping theory suggests that the individual choices made by communities will influence how a technology is used. This means that what makes a 1:1 program a success at one school may not be enough at another. A key question – no matter the location – is, have schools adequately prepared their staff and students for the introduction of the 1:1 program? The implementation of technology must be planned effectively. When students have access to technology through a 1:1 program, using these devices to, for example, only word-process essays, is not enough. If staff are not given time to plan meaningful lessons or to develop their teaching skills and self-efficacy, then there is less chance of technology being implemented successfully.

CHAPTER 3 – METHODOLOGY

The chapter begins by outlining the reasoning behind selecting a constructivist, qualitative research approach for this study (see 3.1). This is followed with an account of my position as researcher within the study (see 3.2) and the potential issues associated with my ‘observer-participant positioning’ (O’Toole & Beckett, 2010). The study adopts a case study approach to investigating and reporting the experiences of the six middle school teacher participants during the initial stages of a 1:1 iPad trial. The use of this method is outlined in section 3.3. A description of the idiosyncrasies of the study location (Castle College) follows in section 3.4. The process used to recruit participants for the study is also outlined (see 3.5). An explanation of the two phases of data collection is presented (see 3.6), including a justification for the survey and semi-structured interviews used. The chapter concludes with a discussion about the data analysis methods used (see 3.7) and an investigation of ethical considerations connected to the study (see 3.8).

3.1 RESEARCH APPROACH

In this study, I aimed to build more complex understandings of teacher experiences of iPads within middle school classrooms and to explore the effective integration of this technology into their classrooms. It is not a process that lends itself to the researcher being a passive observer. Using a constructivist paradigm allows me to take the shared experiences of the participants and build a meaningful account of their experiences.

Scholars of methodology have argued that two main epistemological paradigms exist: the positivist and the constructivist paradigms. In a positivist approach, the object of study is seen as independent of the researchers. Knowledge is discovered and verified through direct observations or measurements of phenomena; facts are established by taking apart a phenomenon to examine its component parts (Coll & Chapman, 2000).

Alternatively, employing a constructivist paradigm usually generates research that contains reconstructed understandings of the social world. A constructivist epistemology acknowledges that the investigator is inherently linked to the environment in which the research is taking place (Lincoln & Guba, 2003). Constructivists typically argue that knowledge is established through the meanings attached to the phenomena studied. Data is generated through interactions with the

participants. The undertaking of the research changes both researcher and subject, and that knowledge is context and time dependent (Coll & Chapman, 2000).

A qualitative approach to research is one 'that seeks to make sense of social phenomena as they occur in natural settings' (Kervin, Vialle, Herrington, & Okely, 2006, p. 37). It involves an interpretive, naturalistic approach to the world. This indicates that qualitative researchers tend to study things in their natural environment while endeavouring to interpret phenomena in relation to the meanings people bring to them (Denzin & Lincoln, 2003). O'Toole and Beckett (2010) describe a qualitative approach as one where there is a 'need to collect, interpret and make judgements about data that cannot be measured – such as what people say and do, and why' (p. 28).

In this study qualitative methods were used to probe the effect of iPads on the daily working lives of teachers. Teacher opinions were sought and have been brought together to develop a focused set of observations and reflections about the studied phenomena. This method was selected as it provided the scope and opportunity for the participants' stories to be told in detail. A quantitative would have provided data that could be analysed but the narrative would have been missing from the finished product.

3.2 RESEARCHER POSITIONING

O'Toole and Beckett (2010) discuss the need to identify the 'observer-participant positioning' of the researcher within the research. The positioning of the researcher has a direct impact on the outcome of the research so it is important to note that I am employed at the school where this research took place. I am employed to teach Information Technology and to develop staff-use of information technology. My actions in this role have an impact on the participants in this study. Part of my role is to assist staff to implement the use of iPads in their classrooms on a daily basis.

Having worked at the Country campus since 2007, I have established a good working rapport with the teaching staff, including the participants of this study. On any given day, I could be performing a multitude of tasks. Half my time is allotted to the teaching of Information Technology classes to middle school students and related activities. In this role, I teach students and have daily interactions with the participants of this study; discussing the progress of a student, attending a meeting together, or having a coffee and a chat about the football game from the weekend.

The remainder of my teaching time is spent improving the information technology skills of the staff based at the Country campus. This includes a variety of activities that can range from working with others to plan the implementation of a new technological initiative, to working one-on-one with a staff member developing their skills. I am expected to observe teachers so that I can make suggestions on how they could better integrate technology into their classes. This involves arriving, often unannounced, to a class and observing; afterwards meeting with the teacher to discuss my observations. I also plan and deliver regular professional development for staff; where some are compulsory and others, voluntary. I have worked with all the participants in this part of my role. I have frequently met with one participant, Mary, in a one-on-one setting and had regular one-on-one meetings with the other participants, albeit in a less structured manner.

According to O'Toole and Beckett (2010) it is important that a researcher be able to objectively observe subjects in some way and to then identify the key themes and outcomes from your observations. My dual position in the research – as an educator and researcher – or as an insider (Merton, 1972), made this challenging. I noticed that some subjects were more selective about what they shared during our interviews, compared to our day-to-day conversations. As discussed elsewhere (see 3.6.2 and 3.8), steps were taken to reduce the impact of this within the study. Concurrently it is important to acknowledge that my insider status also created a situation where I could utilise existing relationships to further investigate and observe the participants than I would have been able to if I were an outsider (Merton, 1972).

3.3 CASE STUDY

Case studies can be used to study contemporary phenomenon in a real-life context. They concentrate on the experiential knowledge of the case and give close attention to the influence of its social, political and other contexts (Stake, 2005; Yin, 1994). Creswell (2007) describes a case study as the exploration of a 'bounded system' over time, through detailed, in-depth data collection, involving multiple sources of information rich in context. O'Toole and Beckett (2010) unpack this further, stating that the boundaries that are set by the researcher can be as wide or narrow as they deem appropriate. A case study could involve an individual or a nation. This case study involves the opinions and experiences of the six educators from Castle College's 2012 iPad Trial

In a case study, Yin (1994) suggests six typical sources of evidence:

1. Documents (letters, agendas, progress reports);
2. Archival records (Service records, organisational charts, budgets etc.);
3. Interviews (typically open-ended, but also focused or structured, and surveys are possible);
4. Direct observations (formal or casual; useful to have multiple observers);
5. Participant observation (assuming a role in the situation and getting an inside view of the events); and
6. Physical artefacts

These multiple sources of evidence are an advantage, as they allow the investigator to develop a detailed understanding of the case being examined. Of the six sources of evidence referred to by Yin, this case study utilises documents, interviews, direct observations and participant observations. Archival records and physical artefacts were not used as no relevant examples were discovered.

In this study, qualitative data was collected through an initial questionnaire of participants about their previous experience with iOS technology (see Appendix 1). The results of this survey – when combined with observations of the participants over the initial stages of the iPad trial – were used to create the questions for a semi-structured interview. These interviews were conducted approximately six months into the iPad Trial and each lasted approximately 30 minutes. The interviews focused on exploring the experiences, thoughts and opinions of the participants at that particular moment and reflecting on their initial thoughts and opinions about the trial. These interviews were recorded and transcribed so that the data could then be sorted and organised into common themes. These themes formed the basis of the results section of this thesis (see Chapters 4, 5 and 6).

A common criticism of case studies is the lack of a systematic approach to the handling of data, resulting in lengthy documents that are difficult to read (Yin, 1994). In this case study the transcribed interviews alone generated a text of almost twenty-three thousand words. To ensure there was a systematic approach to this data, key themes and organisers were identified after reading the transcripts of the interviews. The transcripts of the interviews were then coded using these themes and identifiers. Once the coding process was completed, all references to the various themes were organised into separate documents so that a complete picture of each theme could be viewed. The

identified themes were: classroom management, initial perceptions of the 1:1 trial, engagement and academic impact, professional learning, positives of the iPad trial and negatives of the iPad trial. The results section of this thesis has been structured into the themes and organisers used to code the original interviews. This approach presents a logically structured document that facilitates the reader's understanding.

Another concern is the apparent lack of generalisability that is sometimes associated with case studies (Kervin et al., 2006; O'Toole & Beckett, 2010). This is a valid concern for this study as the entire focus is on one school. The specific context of this study is such that exact duplication is unlikely. However, the generated results, stories and experiences of the participants do have commonalities with others. Lincoln and Guba (1985) describe this scenario as transferability and it has become acceptable within the paradigm of qualitative research. The experiences of these subjects are beneficial to other teachers and educational institutions that are implementing new technology, such as the iPad. What was learnt through this study allows others to negotiate technology initiatives and hopefully achieve increasingly meaningful improvements.

3.4 CONTEXT OF THE STUDY LOCATION

This study was conducted at Castle College, a multi-campus independent school spread across south-eastern Melbourne, Victoria. This high-fee, high-academically achieving school has four campuses:

Campus	Description
Bayside	Located in an affluent inner-Melbourne suburb on the shores of Port Phillip Bay, the Bayside campus has a student population of approximately 1,200 ELC – 12 students. There is high demand for places at this campus and it is surrounded by similarly-priced schools. This is the original campus of the school.
Country	Located on the outskirts of suburban Melbourne this campus is home to approximately 700 ELC – 12 students. Students come from a variety of suburban and rural locations. While there are a number of private schools in a similar area to the Country campus, none have a similar fee structure to Castle College – one that can be seen from the school ground charges a third of the fees. Despite this, enrolments have continued to increase since the campus opened in 1989.
Southern	Located approximately halfway between the Bayside and Country campuses, the Southern campus is home to ELC – 9 students. It is located adjacent to the Senior campus and has a combined student population of 1800 students. There are no similarly-priced schools close to the Southern campus and a limited number of private schooling options.
Senior	Located adjacent to the Southern campus, the Senior campus is home Years 10 – 12 students. Prior to 2009, all Castle College students completed their education at the Senior campus. However, since that time, students have the option to stay at the Bayside or Country campuses, instead of moving to the Senior campus.

TABLE 3.1: CAMPUSES OF CASTLE COLLEGE

The college, established in the 1890s as a boy’s school, has undergone dramatic change throughout the early part of this century. Enrolments have almost tripled in the timeframe, with approximately 3,600 students enrolled in 2012. A key factor in this increase is the decision to open a girl’s college on all campuses in 2000. Male and female students are now educated together up to Grade 4 and, from Grade 5 onwards, they are broken into gender-based class groups. An increased focus on academic excellence has also contributed to this increase in enrolments with the college now being one of the better performing schools according to the National Assessment Program – Literacy and Numeracy (NAPLAN) (Australian Curriculum, Assessment and Reporting Authority (ACARA), 2013).

The 2012 iPad trial was extensive, involving the following groups:

- Student from Years 5 to 11 at the Country campus;
- International Baccalaureate students from the Senior campus;
- Year 9 students from the Southern and Bayside campuses; and
- Staff members who taught one of these groups was also included in the trial.

The staff and students involved in the trial (approximately 150 and 600, respectively) were given an iPad 2 to use for the 12 months of the trial with the understanding that it would be returned to the college at the end of 2012. In 2013, the trial was expanded to become the operating norm for Castle College; every student from Years 5 to 12 at all campuses and their teachers now use an iPad routinely as part of their daily school experience. Given this expansion, students were able to keep the iPad until the conclusion of the 2013 school year.

The implementation of this trial created an obvious increase in the use of technology in the classrooms of the Country campus. Previously, the use of technology was contained to occasional use of classroom-based desktop computers (the majority of classrooms across all campuses contain four computers each) and limited access to larger computer labs (typically between 19 and 26 computers). The commercial learning management system, 'Blackboard', was used throughout the school with varying degrees of success and it was expected that the use of this platform by staff and students involved in the trial would increase through the iPad trial.

Early discussions about the implementation of an iPad trial revolved around how the device would be used in classrooms. It was envisaged that they would be used to support current programs and teaching approaches. The explicit instruction model would remain and there would not be a sudden change in the core teaching philosophy employed by the college. What would probably change were the activities students would complete to demonstrate their understanding of the concepts taught in the class.

The school leadership was adamant that the iPad would not completely replace the use of pen and paper in the classroom. The main reason cited is the need to prepare students for exams during their senior school studies (VCE) where they would be expected to write – by hand – for up to three hours. The other rationale that would impact the use of iPads was that the devices would not be print-enabled whilst at school. These decisions influenced the approaches that teachers took when they were using the iPad.

A model was developed to guide staff in the use of iPads in their classrooms. The somewhat lofty goal was set of ‘improving student engagement and academic outcomes through the use of iPads in a technologically rich world.’ This statement was underpinned with the philosophy of only using the iPad with students when it will have a positive influence on the outcome. Given the tools available to staff and students, three types of activities were described to staff:

1. Something that can only be done on the iPad (changing the molecular structure of a model);
2. Something that can be done better using the iPad (using Google Map to explore a city described in an English novel); or
3. Something that can be done better not using the iPad (completing a spelling test).

Teachers were continually reminded that when something could be done better without using the iPad, then the iPad should not be used. However, as the iPad were introduced as part of a trial, staff were asked to investigate different opportunities and uses for the iPad whilst maintaining the academic rigor that Castle College values. Social shaping theory espouses that these decisions all shape how a technology will develop. In this case, these decisions all dictated how iPads will be used at Castle College.

Teaching staff involved in the trial received an iPad 2 and two professional development sessions (totalling about two hours) prior to the end of the 2011 school year. These sessions covered technical aspects of using the iPad and the pedagogical approach outlined above. Staff also had access to continued professional development throughout the trial, which was delivered by a campus-based staff member who was allocated time to provide support. During the trial I was employed by Castle College to fulfil this role.

This study ran for the first six months of the 2012 trial at the Country Campus. This study was conducted in the middle school of Castle College’s Country campus during this trial period. This trial made the location a good match for the aims of this study as it provided a range of potential participants who were experiencing the pros and cons of this device in an educational setting for the first time. Conducting this study at Castle College’s Country campus also provided approximately 35 potential participants, increasing the chance of generating interest in the study. My insider status (Merton, 1972), created by working at the same campus as the study, also allowed for increased opportunity for observation, interaction and discussion with participants.

3.5 PARTICIPANT SELECTION

The participants in this study were middle school teachers from the Country campus of Castle College. An invitation was sent to all middle school teachers at the campus inviting them to participate in the study. It was hoped that four to six participants would agree to join the study and that those participants would bring a mix of gender, teaching experience and curriculum areas to the study.

The invitation was sent via email to reduce any pressure or expectations that, given my role within the school, could be implied by directly asking individual teachers. Six participants agreed to be involved in the study. This equates to approximately 18% of the total available pool of middle school teachers at the Country campus. As Table 3.1 shows, the participants represented a spread of teaching experience and age groups, although there was a lack of graduate teachers involved. The participants taught a variety of middle school subjects during the study; six out of the thirteen subjects taught in the middle school were represented across the group participants. The lack of a mathematics teacher was the one unfortunate aspect of the voluntary nature of participant selection as it left a gap in the curriculum areas covered. Appendix 4 provides mini-biographies of each of the participants.

Name	Gender	Age	Subjects Taught	Year Levels Taught	Gender Taught	Teaching Experience
Charlie	Male	31 – 40	English, Humanities, Media Studies	5 – 8	Male	10 – 15 years
Henry	Male	41 – 50	Science	Year 7 and 8	Male and Female	20+ years
Anne	Female	51 – 60	English	Years 5 and 7	Female	20+ years
Mary	Female	41 – 50	Drama	Years 5 – 8	Male and Female	10 – 15 years
William	Male	41 – 50	Music	Year 5 – 9	Male and Female	5 – 10 years
Liz	Female	41 – 50	English and Humanities	Years 5 and 7	Female	5 – 10 years

TABLE 3.2: PARTICIPANTS OF THE STUDY

3.6 DATA COLLECTION

The collection of data for this study was broken into two phases. Phase one involved a questionnaire completed by teachers. The questionnaire was designed to ascertain the

participant's opinions about the iPad trial prior to its commencement. This survey involved short response questions that allowed the participants to share whatever they wished about the iPad trial. The responses to this questionnaire were combined with observations made of the participants and then used to develop phase two. This phase involved semi-structured interviews with the six participants, combined with observations of their experiences during the first six months of Castle College's 2012 iPad trial. The same site and participants were involved in both phases. This section outlines these different phases.

3.6.1 PHASE I – QUESTIONNAIRE

During phase one, I generated data focused on participants' initial opinions about the introduction of the 1:1 iPad trial in their classroom. A Microsoft Word document containing a questionnaire was emailed to participants in November 2011 (see Appendix 1 for the questionnaire). The timing of the email was chosen because it followed participants receiving their iPads and completing two, compulsory professional development sessions. By adopting this approach, all participants were already familiar with the device prior to this study and had begun to explore how the device could be used in their classrooms. It was envisaged that this would lead to participants having some considered opinions about the upcoming trial.

The decision to email the questionnaire as a Word document was made with a view to give participants the option to complete the survey digitally or on paper. Participants were also given the option of responding to the questionnaire in another way, if they preferred – in person, for example. By giving participants multiple options to respond, it was predicted that the return rate would be 100%.

The questionnaire implemented in this phase contained three short response questions. The questionnaire was purposefully brief to increase the likelihood of it being completed in a timely manner. This decision was made in recognition of the workload of participants at the end of year. The three questions used in the questionnaire were:

1. Do you have any concerns about the introduction of iPads into your classroom?
2. What do you hope the use of iPads will help you achieve in your classroom?
3. Will the positives outweigh the negatives? How and/or why?

The first two questions asked participants to outline their concerns and potential positives about the iPad program. These questions were deliberately constructed as

open-ended to allow participants the opportunity to discuss any part of the trial; they were free to talk about what mattered to them. The final question was included so that the participants could define their position as being overall positive or negative about the trial. I felt this was important; their attitude towards the trial may influence their experiences throughout the trial.

The questionnaire proved to be an effective starting point in that it generated data about what the participants saw as the pros and cons of the upcoming iPad trial. The answers were detailed enough to allow me to generate lines of questioning for the semi structured interviews in phase two. The questionnaire would have been improved if it asked some background questions such as the participant's previous experiences with iOS devices as this would have helped to gain further understanding of their journey.

3.6.2 PHASE II – OBSERVATIONS AND INTERVIEWS

Throughout the initial six months of Castle College's iPad trial, I observed the participants teaching and other work practices. This observation was largely informal and involved visiting the participants in a variety of settings within the school environment. The participants were observed as they participated in professional development, taught their classes, attended meetings and held informal discussions with colleagues. To document my observations and reflections I used the voice record function on my phone when I had a few quiet moments. This allowed me to immerse myself in the situation I was observing. These recordings were then transcribed and collated at a later date. The resulting notes were organised into themes and used to assist in the creation of questions for interviews with the participants. These notes were also used throughout the writing of this document ensuring that I was not solely relying on my memory of events.

O'Toole and Beckett (2010) state that a semi-structured interview can be used when the researcher is seeking mainly qualitative data and they allow the researcher the freedom to explore difference topics and themes that may arise during an interview. A semi-structured interview was chosen as it was important to be able to explore different themes that arose during the interviews. A tightly structured interview could have limited the opportunities that participants had to provide meaningful insights about their experiences as part of the iPad trial.

Each participant of the study took part in a 30-minute, semi-structured interview. The interview took place at a location of the participant's choosing – ordinarily their office

or classroom. This approach was taken to ensure that each participant was comfortable when being interviewed. The bulk of the interview focused on the positive and negative aspects of each participant's experience in the iPad trial. It provided an opportunity to revisit – and build on – points raised in the initial questionnaire. A list of the questions used for the interviews can be found in Appendix 2 and a transcript of the interview with participant, Anne, has been included in Appendix 3, as an example.

Interview recordings were transcribed and shown to the participant to confirm their accuracy. The text was then organised, coded and grouped into common themes so that it could be analysed. The main themes identified were: initial thoughts about the iPad trial, positives of the trial, negatives of the trial, classroom management, technical issues, academic impact and teacher workload.

The majority of the observations in this phase were based around interactions between the participants and myself, in my professional role at Castle College. Communication with the participants at times when the trial was not running smoothly was also conducted through my professional role; as was feedback about positive experiences. I watched each participant teach and I helped them to develop new skills with the technology. I had the enormous pleasure of watching them grow professionally as they experienced the highs and lows of integrating a new technology into their professional practise. Throughout the interview and observation processes, each participant was aware of my role as the Director of Learning Technology. As the Director of Learning Technologies, I was responsible for the implementation of this trial at the Country campus and this had a significant potential to limit or influence what the participants contributed in this phase. To counteract these concerns, I reassured participants that Castle College was not running this research and, while the results would be available for anyone at the school, the research was not being conducted for the benefit of Castle College. I was not evaluating their ability to use the technology for the college nor was I judging their ability to teach their classes. Since 2007, I have spent considerable time building a non-judgemental, reassuring relationship with the staff at the Country campus. I have helped them when they are not sure how to get the most out of the technology they have available to them. The relationship I have with the participants, an insider as Merton (1972) describes it, was a benefit to this study, rather than a hindrance. Participants shared successes with me – not as a researcher, but as their peer, supporting them in the use of technology in their classes. Conversely, when things did not work as well as the participants wanted, they could readily and confidently communicate it to me in the hope that I could assist them to prevent a reoccurrence. My

sound and candid relationships with the participants, my insider knowledge of the participants and organisation, was the main tool I used to counteract the conflict generated by my dual roles within this study (see 3.8 for further discussion of this issue).

3.7 DATA ANALYSIS METHODS

To achieve the necessary thoroughness in the analysis of the data collected, I decided to use an analysis method that involved revisiting the data on a regular basis. The simplified version of Creswell's (2007) data analysis spiral (see Figure 3.1), presented by Kervin et al. (2006), was selected as the analytical approach for this study because it is both recursive and succinct. Three processes are involved in the analysis of the data: familiarisation with the data, categorisation of the data and synthesis of the data (p. 140). The recursive nature of the approach created the necessary scope to revisit earlier processes to further the understanding and analysis of the data.

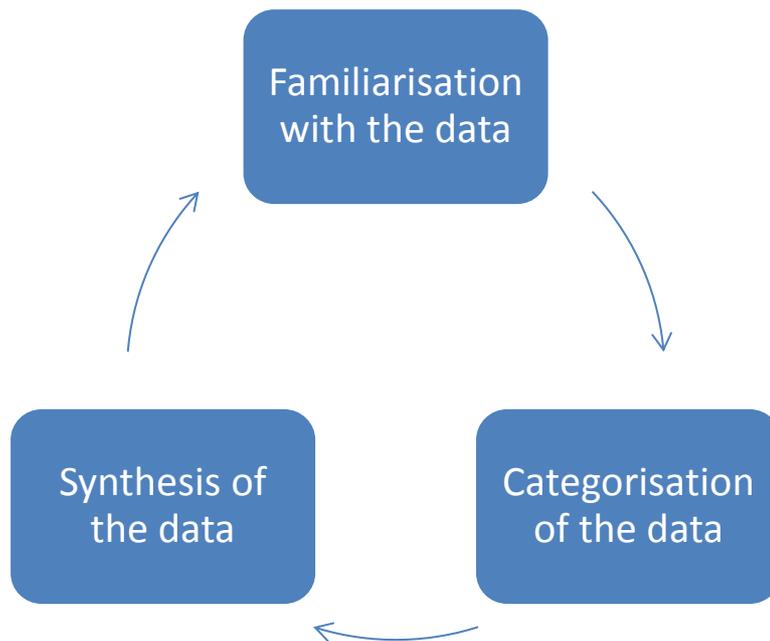


FIGURE 3.1: DATA ANALYSIS SPIRAL (KERVIN ET AL., 2006, P. 140)

A thorough familiarity of the data collected is necessary in any study. This can be achieved through organising quantitative data in different ways and observing how different values relate to each other. In qualitative studies, such as this one, the familiarisation process can occur during the transcription of interviews. Themes can be identified in one interview and then searched for in other interviews; doing this in

between interviews with participants, allows for the themes identified in one interview to be investigated in the next. Reading the data several times is another way to achieve the necessary familiarity.

Kervin and her colleagues describe the formal categorising of data process as 'logico-inductive analysis.' In this process, the researcher engages both thought and logic to develop an understanding of the data before them (p. 142). There are usually numerous possibilities for the researcher to divide, sort or order the data, and several may be trialled before settling on one that best suits the needs of the study. The categories used can be devised from patterns in the data or from the research questions devised before undertaking the research. Throughout this process the researcher will often create notes that outline key points, thoughts or general observations about the data (Kervin et al., 2006, p. 142). Coding of data allows the researcher to test the appropriateness of the categories decided upon. If there is little need for a category, then the researcher will return to the data and investigate different possible categories. During this process, a critical eye is necessary to identify the introduction of bias (Kervin et al., 2006) (see 3.8 for further discussion).

The synthesis of data involves the development of an understanding of the data and how it relates to the study. Often, initial hypotheses and theories are revised as the data collected may indicate something different to what was originally thought. It is in this stage that the interpretations of the data are clearly communicated to the audience. The conclusions that are made by the researcher should have a clear connection to the collected data and relevant literature (Kervin et al., 2006). Table 3.3 outlines how these three processes manifested within this study.

Data Analysis Process	Application in this Study
Familiarisation with the data	<ul style="list-style-type: none"> • Transcription of the interviews; • Identification of initial themes and exploring these with participants; • Re-reading the collected data whilst looking for patterns and trends.
Categorisation of the data	<ul style="list-style-type: none"> • Refer to initial notes and decide on the categories to use; • Examine the participant surveys and manually label each occurrence of the category; • Read through the transcribed interviews and use the same categories to label relevant statements using colour codes where possible; • Collate the different categories into separate documents to enable all relevant data to be viewed together; • Liaise with participants to ensure the accuracy of the categories and notes.
Synthesis of the data	<ul style="list-style-type: none"> • Identify the theories and understandings from the data; • Revise original research questions; • Review the literature related to the developed understandings; • Present theories, understanding and arguments based on the data.

TABLE 3.3: DATA ANALYSIS PROCESS USED IN THIS STUDY

3.8 ETHICAL CONSIDERATIONS

All research needs to consider its ethical dimensions. To ensure that this research carefully considered ethical dimensions, the following steps were undertaken:

1. The project was given ethical approval by the Monash University Human Research Ethical Committee, after a rigorous approval process;
2. Participants gave informed consent by signing consent forms. This form explained to all participants that their involvement was voluntary and that they could withdraw at any stage;
3. All interview transcripts were ‘member checked’ by participants to ensure accuracy; and
4. Pseudonyms have been used for the school, campus and all participants. All audio recordings made of interviews were transcribed and all recordings and transcriptions remain securely held.

As discussed previously (see 3.2 and 3.6.2), the position I hold within Castle College created a potential conflict of interest that has ethical implications for the study. As with all research, it was important to ensure that all participants were treated ethically

throughout the study. To not do so would have impacted the results of this study, as participants may have moderated their contributions. It also had the potential to place participants in an unfair position by being asked to discuss their use of technology with the person who is responsible for technological implementation across the campus. Table 3.4 outlines how these concerns were addressed:

Process	Description
Recruitment through email	Seeking participants through a group email to all middle school teachers at the Country campus. This was undertaken as a collective exercise and conducted electronically in an attempt to remove pressure – implied or otherwise – on potential participants to be a part of this study. This process was the only attempt to recruit participants and I made a conscious effort to not personally approach any colleagues about participating in the research, apart from the initial email. In another attempt to avoid a conflict of interest, the decision was made to not follow up with colleagues who had verbally indicated their interest, but who did not return their consent form.
Independence of study	Reminding participants that any contributions they made to this study was for the study only and not for use by Castle College.
Acknowledgement of duality	Acknowledging the nature of my dual role and the potential power-imbalance that this created for the participants and discussing the potential issues that may arise as a result.
Building on existing trust	Using the rapport and trust of existing relationships with participants to create an environment where they (the participants) felt safe enough to contribute honest feedback without fear of ramifications.

TABLE 3.4: PROCESSES IMPLEMENTED TO REDUCE POTENTIAL CONFLICT OF INTEREST

It is also important to note the obligation that I have to Castle College as a staff member. Early in this study, I had some serious concerns about this dual role, particularly with my own ability to reduce the influence of any bias that reporting on the school – for which I work – may create. Table 3.5 outlines the procedures enacted in an attempt to reduce the effects of bias on this study:

Process	Description
Acceptance of results	Taking the initial standpoint that the findings, whether positive or negative, gives Castle College information it can use to improve.
Question selection	When writing survey or interview questions looking carefully at the purpose of the question and its wording to ensure that it wasn't leading.
Checking conclusions	Constantly questioning the conclusions made during the analysis.
Member checks	Discussing the findings with the participants and confirming that the conclusions reached were valid and justified.

TABLE 3.5: PROCESSES IMPLEMENTED TO REDUCE POTENTIAL BIAS

Chapter 4 explores the importance that professional learning played in the iPad trial and as I am responsible for overseeing this at the Country campus, the issue of bias became increasingly important in this study. This issue will be further explored as part of this discussion.

CHAPTER 4 – PROFESSIONAL LEARNING

Before delving too deeply into this chapter some clarification is required about the differences between how the terms ‘professional learning’ and ‘professional development’ are used in the context of this study; professional learning describes an ‘individual autonomy and motivation, an image of professionals consciously monitoring their professional practice, learning from their work, and arriving at new understandings or knowledge on that basis’ (Doecke, Parr, & North, 2008, p. 9). By comparison professional development can be defined as ‘activities done at the behest of employers or systems, involving knowledge that is delivered by outside experts’ (Doecke et al., 2008, p. 9). Going further, throughout this thesis the term professional development has been used to describe school run, large group training sessions that participants were expected to attend; professional learning is considered to be self-motivated learning that occurs in a more organic fashion.

Professional learning was a consistent theme throughout this study. This chapter – the first of three focusing on the results of this study – delves into the role professional learning played throughout the iPad trial. The experiences of the participants indicate that traditional, professional development sessions were not the most effective way to improve teacher skills with new technology. Links are made to the domestication of technology theory (Siverstone et al., 1992), to explore the value of professional conversations and professional learning opportunities targeted at an appropriate skill level. This chapter draws heavily on the findings and related guidelines from the National Mapping of Teacher Professional Learning Project (Doecke et al., 2008). The seven key findings and associated guidelines (see Table 4.2) outlined in the report reinforce many of the opinions voiced during discussions with the participants about their own professional learning. As the study progressed and professional learning emerged as a theme to be further explored I did some further reading and appreciated the logical approach taken by Doecke and his colleagues.

In this chapter, background information about professional development at the Country campus is firstly discussed (see 4.1), before looking at the professional development experiences of the participants throughout the study and the lessons learnt about the value of planning quality, professional learning programs for teachers (see 4.2). The importance of professional discussion as a tool for professional learning is subsequently discussed (see 4.3), before the chapter concludes with a broader look at the implications for professional learning (see 4.4).

4.1 BACKGROUND

As an employee of Castle College I have a pivotal role in delivering ICT-based, professional development to staff at the campus where this research took place. I have delivered a large part (but not all) of the professional development discussed in this section. This is highlighted at this point to again acknowledge any potential conflicts this dual role has within the research and to emphasise that measures have been taken to address the ethical dilemmas and the risk of bias being introduced into the research (see 3.2, 3.6.2 and 3.8). Managing the duality of these roles was a bigger challenge than originally expected. However, the measures put in place have been largely successful in protecting the integrity of this study. Acknowledging this issue, at this point, is another attempt to ensure that any bias is recognised. In completing the analysis and presentation of results, I have consistently questioned the validity of what was found. Often, it was very easy to discuss what I believed was being said – especially when it reflected well on the iPad trial or me – rather than what the collected data actually indicated. By consistently checking the data and consciously asking myself, ‘Is this what the data is saying or is it what I want it to say?’ I was able to uphold the integrity of the study.

Participants reported completing a variety of iPad-based, professional learning throughout the research period. This training came in several forms as outlined in Table 4.1.

Professional learning undertaken by study participants	Description
Formal Professional Development sessions	<p>A presenter took the participants through a set of skills they were trying to develop. These sessions ran with a number of configurations, including:</p> <ol style="list-style-type: none"> a. Large group, such as the entire middle school staff, where skills, apps or strategies important to all teachers in the trial were shown; b. Small group, such as a faculty, where subject specific skills, apps or strategies were demonstrated and explored by the participants; and c. Informal small groups, where interested participants could attend a session on the use of a specific app.
One-on-one sessions	Participants learnt something that met their immediate needs. This could have been instigated by them or as a result of a suggestion.
Show-and-share sessions	These normally occurred at the conclusion of meetings and involved one staff member spending five minutes showing everyone else something that they had been doing in their teaching with iPads
Professional discussions	Professional discussions were informal conversations that took place throughout a normal day between colleagues. These discussions were focused on how different staff members were integrating the iPads into their classes.

TABLE 4.1: PROFESSIONAL LEARNING UNDERTAKEN BY STUDY PARTICIPANTS

Throughout the course of this study participants took advantage of these formal and informal campus based professional learning opportunities. Some of the sessions were mandated by the school, with the express aim of developing a set of core iPad skills within the staff and the pedagogical knowledge to utilise the iPads effectively within the classroom. Other sessions were voluntary and each of the study participants approached these in a different way. Mary, for example, had a clear idea of how she wanted to use the iPads with her classes, but lacked the skills to implement her ideas. I met with her weekly with the aim of developing her skills so that she could effectively integrate the iPad and 'Blackboard' (LMS) into her drama classes. Due to her other responsibilities, Anne was very time poor. To cope with this, her professional learning comprised of brief sessions that would include me answering technical questions so that she could facilitate her students' use of the iPads. Her questions were often based on previous discussions with other colleagues that would spark an idea for her. Liz, Charlie, William and Henry were all keen to learn about how they could maximise the use of the iPad with their classes and they would attend voluntary, after school sessions that covered a range of different apps and curriculum integration strategies. Henry

would always ask questions about how to use the apps. William preferred to sit back and absorb the information before coming back with questions a few days later. Liz and Charlie would ask lots of technical and pedagogical questions about how they could use the iPad with their students.

4.2 PLANNING FOR QUALITY PROFESSIONAL LEARNING

‘Professional learning is no longer perceived to be an add-on, but is viewed as an integral part of teachers’ professional lives which best occurs over a sustained period of time, instead of one-off professional development sessions which are generally perceived to be of little value.’ (Doecke et al., 2008, p. 259).

The majority of the participants in this study agreed with the finding of Doecke and his peers that professional learning was highly valued because it was a way to improve their professional practice. One-off sessions that did not meet the needs of the participants, for whatever reason, were seen as demoralising and a waste of time. After one session, Mary reported:

It was upsetting because it went so fast and it wasn't effective at all for me. It was demoralising; so that was no good. The first one [professional development session] was good. It was all novel and new and things were explained, they had enough help in the room and the second one wasn't.

I was able to watch the participants of this session because an external facilitator had been organised, leaving me free to observe. While William, Henry and Anne found it helpful, Mary clearly did not. This was because she was not technically proficient or confident enough to fully comprehend the content covered. Liz and Charlie were already aware of the content being covered and, as such, did not gain much from the session. Using the participants of this study as a benchmark for the whole group, 50% of attendees found this session useful. This means that a minimum of 17 teachers who attended the session found it unhelpful, equating to almost half of a working week for one staff member not being spent effectively. As an organisation, this is not an effective use of time. Returning to Doecke, Parr and North’s assertion that, ‘professional learning should not be a standalone event but rather a regular occurrence over a sustained period of time’ (p. 259); this session lacked effectiveness because it did not cater to the needs of the individual participants and not because it was a standalone session. It was the second introductory session to the iPad and it was followed up with multiple sessions as outlined later in this section.

Feedback from participants reinforced some of the findings from the Australian Government’s 2008 National Mapping of Teacher Professional Learning Project (Doecke et al., 2008), as shown in Table 4.2. The project also set out some guidelines for teacher professional learning. Amongst others, these guidelines state that ‘professional learning should be diverse, and appropriate to the individuals’ and groups’ needs’ (p. 260) and ‘teaching should be recognised as engaging in continuing inquiry into practice, and this inquiry should be recognised as strongly collegial and collaborative in nature’ (p. 262). Mary’s earlier quote suggests that the professional development session she attended was not successful for her because it was not appropriate to her needs at that time.

Number	Key Finding	Guidelines for Professional Learning
1	Professional learning is a key way to implement reform at both a system wide and school level.	<ul style="list-style-type: none"> Professional learning should involve strategic planning, at system-wide, school and individual levels.
2	Professional learning is integral to the professional lives of teachers, not an ‘add on.’	<ul style="list-style-type: none"> Professional learning should be explicitly embedded within teachers’ work. Professional learning should be diverse and appropriate to the individuals’ and groups’ needs.
3	Professional learning is being shaped by standards-based reforms.	<ul style="list-style-type: none"> Teacher registration bodies, systems and schools should work together to share their historical and contemporary knowledge about inducting early career teachers into the profession. Governments, teacher registration bodies and schools themselves should investigate and value a variety of evidence in accounting for teachers’ professional learning.
4	Professional learning is dynamic, collaborative and generative.	<ul style="list-style-type: none"> Schools and teachers should be encouraged to form and develop a range of professional learning partnerships.
5	Professional learning is grounded in local school communities.	<ul style="list-style-type: none"> Teachers should be encouraged to develop and/or extend professional learning networks with colleagues.
6	Professional learning involves an enhanced role for universities.	<ul style="list-style-type: none"> Sectors should be encouraged to work collaboratively in cross-sectoral partnerships.
7	Professional learning involves practitioner inquiry	<ul style="list-style-type: none"> Teaching should be recognised as engaging in continuing inquiry into practice, and this inquiry should be recognised as strongly collegial and collaborative in nature.

TABLE 4.2: KEY FINDINGS AND RELATED GUIDELINES FROM THE NATIONAL MAPPING OF TEACHER PROFESSIONAL LEARNING PROJECT (Doecke et al., 2008)

A tension does exist between the responsibilities of the organisation to provide adequate training for a new initiative and an educator's responsibility to ensure that they are armed with the necessary skills to do their job well. In this instance, the training session mandated by the college was not appropriate to the needs of Mary and the majority of her colleagues. The majority of the participants sought regular one-on-one assistance that was targeted to their specific needs; this being the form of professional learning that best suited them. Charlie explains:

You know, the only things that I have done, I've gone out of my way to ask you questions about different programs, as they came up, and that is probably the best professional development is when you have got need that you get it straight away.

Like Mary, Liz experienced frustrations with large group training sessions:

What doesn't work for me is when somebody quickly skims through something and says, 'You can do this, you can do this, you can do this.' What works better is if step-by-step, than at the level I'm up to. That's hard because you need to find where people are up to and start at that level for them but modelling, very much modelling what's happening and showing the process and showing the product at the same time.

Feedback from the majority of the participants of this study supports the notion presented by Doecke et al. (2008) and Donovan et al. (2007) that if the implementation of a new technology is to be successful, professional learning opportunities should be targeted to the needs of each individual.). They claim that introducing new technologies into an educational setting should be seen as a long-term, highly-complex process, where educators work through stages of competencies, familiarity and comfort with the technology. Those introducing the technology would benefit from professional learning opportunities that are appropriate for their skill level and in a format which they are comfortable. There is not a 'light bulb moment' where, suddenly, every teacher within a school is using a new technology well. Accepting this paradigm facilitates the introduction of the domestication of technology theory (see 2.2.2) into the conversation. The four stages of technological domestication (appropriation, objectification, incorporation and conversion), as outlined by Silverstone et al. (1992), can be used to track the progression of participants as they increase their skill level, familiarity and comfort with the newly-introduced iPad and, subsequently, implement it into their daily

classes practice. The role that professional learning plays varies within these stages and it is this role that is now focused on.

Mary and Henry's responses to the initial professional development sessions, together with other evidence of their limited exposure to iOS devices and their focus on learning how the iPads worked, suggest that they are operating at the appropriation stage of domestication (Silverstone et al., 1992). This entailed them becoming familiar with the device and its capabilities. In this stage, they were developing an understanding of what the device was and how it worked. These participants, Mary in particular, found the second training session proceeded too rapidly and, as a result, wasn't effective. This content, when combined with some technological complications the presenter experienced during the session, resulted in a sense of frustration amongst participants, as demonstrated by Mary's earlier quote, in this section.

Like Mary and Henry, Charlie and Liz also found this professional development session to be unbeneficial, but for different reasons. These participants were already familiar with iOS devices and discussions with them focussed on how they could best utilise iPads with their students. This suggests that Charlie and Liz were operating in the objectification stage. In this stage, participants take the technology and attempt to decide how it is integrated into their daily life; in this case referring to their teaching practice (Silverstone et al., 1992). As they were already familiar with the content covered by the presenter, they also left the second training session with a sense of frustration as they were ready to learn more curriculum-based skills, which were not covered in the session. Liz described the session thus:

A waste of time. I knew most that anyway but had I not it would have been a complete waste of time because he was all over the place.

Of all the participants, William and Anne found this session the most beneficial. They left the session with an increased understanding of how to use 'Pages' and 'Keynote', as well as the classroom potential of 'Goodreader' to annotate PDF documents for assessment. This helped them to develop an understanding of how they would use the iPad with the students. Anne described the initial training as a 'really positive experience'. These observations, when looked at in unison with their skill levels indicate that they were also operating in the objectification stage, however, with less confidence than Charlie and Liz.

Considering these observations – and looking at the domestication of technology theory – it is reasonable to conclude that it would be beneficial to use the different stages as starting points when planning school-wide professional learning programs. The professional development session that is the focus of this section was run multiple times due to the large number of staff that had to undertake the training. Staff were asked to enrol in a session that was running at a time that suited their schedule.

Another option could have been to, instead, ask staff to identify which domestication of technology stage they were working in and then, select a corresponding session. To facilitate the selection process, a meaningful description of each of the stages would have been created and distributed (possibly outlining behavioural examples), so that staff could make an informed choice about the best session for them. Organising sessions with such an approach would have led to Mary and Henry experiencing a session that focused on their need for basic skill development, while Charlie and Liz could have had a more curriculum-focused session that looked at different strategies for the use of iPads in their classes. This approach also ties in with the National Mapping of Teacher Professional Learning Project's guidelines that state: 'Professional learning should be diverse, and appropriate to the individuals' and groups' needs' (Doecke et al., 2008, p. 260).

Returning to the 'light bulb moment' – or lack thereof – in the implementation of new technology within a school, there is no *one* moment where all teachers are suddenly using technology well. The participants in this study each undertook their own similar, yet unique, journey through the different stages of domestication. They approached each stage differently and coped with it in their own way. Liz, for example, worked through the objectification stage and into incorporation by trialling lots of different apps to see what was appropriate for her needs; she spent a lot of time researching different options online. Mary, on the other hand, spent longer in the objectification stage and focused on the list of core apps provided by the school. She also conducted research. Unlike Liz, Mary's research was done face-to-face, with local experts.

Implied choices have been discussed throughout this chapter, Mary deciding how she wanted to use the iPads in her classroom, Anne's preference for short, sharp professional learning sessions, Liz's development of her professional learning network and Charlie's decision to seek one on one help when he needed it are all examples of these choices. These choices indicate how social shaping theory (see 2.2.2) can explain the development of iPad use within the Castle College community. Each of these choices,

whether thought out or instinctive, dictates how this technology will be used on a daily basis within the community.

Of the seven key findings from the National Mapping of Teacher Professional Learning Project (Doecke et al., 2008), two (numbers one and two) can be addressed through providing an environment where professional learning is supported and staff are able to move through the four stages of technological domestication in a manner in which they are comfortable. Three of the remaining findings (numbers four, five and seven) can be addressed through both formal and informal professional discussions and conversations, which is now discussed in more detail.

4.3 PROFESSIONAL DISCUSSION AND CONVERSATION

In addition to formal professional learning sessions, informal professional discussions also proved to be a valuable form of professional learning for study participants. The rate of professional discussions between the participants and their peers increased with the implementation of the iPad program. Anne cites this example:

But the thing I find iPads have done, they've created a genuine interest in education with the teachers and so what we are finding is a lot of the incidental stuff sitting around the table at lunch, 'Look at this what I've just found.' 'Guess what I've just done. Have a look at this.' It's that collaborative sharing of things has been really good.

Anne's observation demonstrates the potential benefits that professional discussions can provide in the midst of organisational changes. The learning that can occur through professional interaction is valuable as it can be directed by the individual. It is individual professional growth (or learning) that should be aimed for, as opposed to attending broad professional development sessions that have been mandated by the school (Doecke et al., 2008). As the learning curve of the participants levelled out these conversations occurred less frequently amongst the participants and their peers. Following the domestication of technology framework, it is possible that the reduced frequency of professional discussions is an indication of progression between different stages.

Every participant discussed the valuable professional learning they undertook through professional discussions with peers. Throughout the initial stages of the iPad trial, I noticed an increased focus on the use of technology in these professional discussions.

Each of the participants engaged in professional discussions to some degree. Liz was heavily involved, as she was seen by many as somewhat of an expert. On campus Liz was able to provide assistance to others and occasionally add to her own understanding through professional discussions. However, Liz spent a significant amount of time online, using Twitter and other platforms, to extend her professional learning network. This led to her engaging in valuable professional discussions with peers from all over the world. Throughout the study I observed Charlie, William and Henry actively participating in professional discussions with their peers about the use of iPads. William also reported that he held semi-regular discussions via email with peers at other campuses. Mary reported that she had some discussions with Liz and other staff members. However, she was not observed participating in these conversations as often as her peers. This may be because she was still working in the objectification stage – still trying to make sense of the best way to use the iPad. It may also be because she had a weekly, one-hour meeting with me, where we covered a range of different iPad related topics. A simpler explanation for this could be that Mary works from a smaller office that I did not visit as often as other offices during the day to day machinations of my work.

These discussions – opportunities for professional learning – are important because they give individuals opportunities to explore or hash out new ideas in a way that they can't on their own. I watched William and Charlie (music teacher and generalist primary teacher, respectively) share how the iPad could improve their classes; each built on an established knowledge and helped the other to do the same thing. The focus of this discussion was how the iPad could be utilised to introduce a 'flipped classroom' approach to their teaching. Each had different experiences with creating video content to use with their classes, they shared their respective skills and strategies and came to a common understanding of how they could implement this strategy. This conversation was only five to ten minutes in length, but it was a valuable one nonetheless – in many ways, more productive than some, hour-long, formal professional development sessions.

The level of professional learning completed by the participants varied from person to person. Liz had an existing passion for the use of technology in education and continued to improve her skills. During her interview Liz noted that she did this through:

1. Attending conferences and other ICT based professional development;
2. Consistently looking for new apps and new ways to successfully integrate them into her classroom;
3. Utilising Twitter to build her professional learning network so she could continue to build her knowledge; and
4. Engaging others in the workplace in professional discussions about the use of iPads in the classroom.

Mary has always been keen to use technology with her classes. However, before the trial, it was difficult for her to gain access to the technology she wanted to use. She had several one-on-one sessions with me to build her skills with the iPad, the 'Blackboard' LMS, apps and integrating them into her classes. These sessions were the cornerstone of Mary's professional learning plan. Unfortunately, there is only one other drama teacher at the Country campus; resulting in Mary having less opportunity to have curriculum-specific discussions about the integration of iPad technology when compared to other participants.

It is now useful to return to Table 4.2 and the key findings and guidelines proposed by the National Mapping of Teacher Professional Learning Project (Doecke et al., 2008). Key finding 5 relates to having a professional learning network at a campus level and while Mary has a professional learning network of peers from a range of schools and curriculum areas, if this network consisted of more campus-based colleagues from the same discipline, then this would give her another avenue to have professional discussions and improve her integration of iPads into her curriculum.

The Australian Professional Standards for Teachers (APST) outline what constitutes teacher quality (<http://www.teacherstandards.aitsl.edu.au/>). To be considered proficient at Standard 6.3 (Engage with colleagues and improve practice), teachers are expected to contribute to professional discussions with colleagues with the aim of improving professional knowledge and practice (AITSL, 2012). Similar standards, recommendations or practices are becoming common in educational systems around the world (e.g. The Scottish Government, 2009; Schagen, 2011).

4.4 IMPLICATIONS FOR PROFESSIONAL LEARNING

As previously stated, this study supports the notion that one of the most important aspects of any new technological implementation in a school setting is the need for a

professional learning program that is targeted at the specific skill levels of staff (Doecke et al., 2008). The majority of participants saw little value in large, all-encompassing, group training sessions where there was limited differentiation to suit the individual needs of the attendees. This lack of differentiation helped to create an environment where the attendees who were unfamiliar with the technology struggled to comprehend the information and the attendees who were further advanced were bored. The participants reported that small groups or one-on-one professional learning opportunities were more beneficial, especially when it was needs-based and timely. Anne cited two examples of this:

The best for me is really one on one or small group. I really like sharing the ideas at our Middle School meetings means.

and

But the thing I find iPads have done, they've created a genuine interest in education with the teachers and so what we are finding is a lot of the incidental stuff sitting around the table at lunch, "Look at this what I've just found." "Guess what I've just done. Have a look at this." It's that collaborative sharing of things has been really good.

To continue looking at the impact professional learning has on the implementation of a new technological initiative, it is worth revisiting the question posed in the literature review: 'does technology drive change within society or do organisational, political, economic and cultural factors manipulate the design and implementation of a technology?' Using a technologically deterministic approach would suggest that any professional learning would be designed to meet the changing facets and features of the technology; in this case, the iPad. The training would be a response to the development of the iPad (Bimber, 1994; Heilbroner, 1994; Oliver, 2011; Pinch & Bijker, 1987).

In this case, I am inclined to take an anti-essentialist stance. The technology has been developed and improved over time, but the power of the iPad in a school setting is directly proportional to how it is used. Yes, it is a useful tool, but without educators seeing that potential – and then, dictating how it is used with their students – it would just be another piece of technology sitting in a classroom. This assumption indicates that the stages of technological domestication could be used to assist in the planning and implementation of a professional learning program. The varied rates that participants improved their skills and familiarity with the technology, which could be explained as participants progressing into different

domestication stages, contributed to a situation where individual programs would have benefited their development. Table 4.3 is an attempt to summarise the conversations with participants about professional learning. This summary is presented in the form of recommendations about effective professional learning that have been developed throughout this study. These recommendations are by no means exhaustive and may be seen as obvious, but they do represent the thoughts and opinions of the participants of this study.

Professional learning should...	Explanation
...be targeted to the skill level of the teacher.	This is essential so that skills can be developed quickly and also instil confidence in the technology;
...be delivered in a variety of formats	This is to ensure that the participant has the opportunity to make the most of the learning opportunity. Individuals have preferences for how they develop new skills. Some like to sit in lecture theatres and allow the information to wash over them while they draw on a piece of paper; others like to be in a small group and ask lots of clarifying questions. There is no right or wrong method, but an effort should be made to ensure that different learning styles are catered for;
...be available for just in time learning.	Professional learning can be as simple as finding someone to help you when you are not sure what to do next. Having to wait for 10 days until the next formal professional learning session can become demoralising for new users and it generally means that they will stop using the technology because it is all 'just too hard!'

TABLE 4.3: RECOMMENDATIONS FOR EFFECTIVE PROFESSIONAL LEARNING.

This chapter set out to demonstrate the importance of professional learning opportunities for teachers during a technological initiative, in this case a 1:1 iPad trial. It also attempted to show how technological domestication theory could be used to guide individuals when deciding on what professional learning they will undertake, although this is an area that requires further study. While this chapter focused on professional learning the next will investigate how the participants actually used iPads with their students.

CHAPTER 5 – THE TEACHER AND THE 1:1 PROGRAM

This chapter discusses how the participant teachers responded to the 1:1 iPad trial. While this study focuses on the iPad, its findings are relevant to 1:1 programs incorporating other technologies. As such, research into a range of educational technology scenarios are presented to support the findings discussed.

This chapter begins with a discussion of the study participants' initial thoughts about the use of iPads in their classrooms (see 5.1). Through this discussion, I highlight and discuss the potential challenges (many of which were based around unknown aspects of the upcoming trial) and benefits (mainly the potential of increased student connectivity) participants expected from the trial. The majority of the concerns mentioned by the teachers in this study can be grouped into three questions:

1. Will the students use the technology properly?
2. Will all the technology work as it should?
3. How am I going to use it?

If a school adequately prepares their staff with these questions in mind, then there should be a reduction in teacher concerns about potential 1:1 programs.

The remainder of the chapter is dedicated to exploring the messy realities of using iPads in the classroom, from the participants' points of view. This is achieved through an exploration of how the introduction of a 1:1 program has altered the work life of study participants (see 5.2); including communication with the school community (see 5.2.1), curriculum preparation (see 5.2.2) and pressure on curriculum (see 5.2.3). Participants were required to set aside time to address these areas – often encroaching upon their non-working hours. However, three of the six participants reported that the payoff in the learning experience for their students was worth this additional outside of work time. The concluding section of this chapter explores the need for teachers to be aware of the classroom management challenges that teaching in a 1:1 environment can create (see 5.3).

5.1 INITIAL THOUGHTS 1:1 IPAD TRIAL

'In short, if every kid has a working iPad at the start of every lesson, with the apps we need, then I think we'll have some fun and achieve a lot.' - William

Early in the 2012 iPad trial, participants were asked about their initial reactions to the news that Castle College was going to be conducting an extensive 1:1 iPad trial. The question was open-ended and participants were encouraged to have the conversation wherever they wanted to. Two common responses emerged at this point: excitement and positivity.

Mary: 'So for me, it meant a bit of excitement and a little bit of time...'

Liz: 'I was really excited and I am still excited about having iPads.'

Charlie: 'I had used iPads before, so I was pretty excited about it.'

Anne: 'It's portable, it's small, it's instant, it's exciting, it's colourful.'

Despite this excited anticipation, there were also a number of concerns held by different members of the group. The majority of these concerns were borne from a lack of knowledge or understanding about how the iPads were going to be implemented in their classrooms. What follows, in this section, is a summation of the participants' concerns at the beginning of the trial (see 5.1.1), followed by potential opportunities that participants identified (see 5.1.2). Overall the number of concerns participants held about the trial outweighed the potential opportunities that they identified.

5.1.1 THE CONCERNS

Participant concerns centred on the following:

- classroom management in a 1:1 iPad classroom;
- cyber bullying;
- availability due to student forgetfulness or damage;
- the potential loss of curriculum time due to training students to use the iPad and the negative impact or influence on this would have on learning;
- the school's decision to not allow printing from the iPads;
- the cost of subject specific apps and how this would be embraced by the school community; and
- the issues of the reliability of the iPads and supporting infrastructure;

Many of these concerns may seem unimportant at first glance. They are, however, worth investigating because any one of these concerns may be enough for one of the participants to prematurely form a negative opinion about the 1:1 approach.

One of the most prevalent concerns, mentioned by four of the six participants, was the management of the devices in the classroom. These concerns focused on not being able

to control what students were doing on the iPads. For example, Mary, William and Charlie were concerned about not being able to see the screens of student iPads at any given time. This stemmed from a concern about students using the iPads inappropriately during class. This was a new phenomenon to these teachers as they had not worked in a technologically-rich environment before. One of the results of these concerns was participants looking for ways to lock the iPads, or to use technology to control the students' ability to access content through the iPad. These concerns are not unexpected or unique to this study. Similar 1:1 trials have encountered issues with the 'distractibility' of devices for students. Milman, Hillarious, O'Neill, and Walker (2013) recommended that teachers accept that student distraction is normal and would happen with or without technology. Zucker and Hug (2007) found that just over a third of students found a 1:1 laptop environment to be distracting and 58% of teachers reported that they had to ask a student to stop their off-task behaviour a least once per class period. LaMaster and Stager (2012) argues: 'Will students test the limits of acceptable use? Of course – they're teenagers. But quite frankly, I would rather they test boundaries in the safety of school than out on the wild, unfiltered web' (p. 7). While most educators would prefer a distraction-free classroom, this is not always achievable – you never know when a dog will wander past the window! Ultimately, a bigger issue than the device itself is how educators manage the distraction factor that new technology can create and, instead, they should focus on harnessing the educational potential that a 1:1 classroom can provide.

The potential of the iPads to be used for 'cyber bullying' (the sending or posting of harmful or cruel text or images via the internet) was initially identified as a concern, especially by participants who were in leadership positions within the school, such as Anne. While cyber bullying was a known issue within the school community – as it is worldwide (Feinberg & Robey, 2009) – this was not a significant issue at the campus before the iPad trial. There was some concern expressed by Anne and Liz that increased student internet connectivity might lead to an increase in online bullying incidents. Corn et al. (2010) found that, while cyber bullying was a concern, introducing a 1:1 program in a North Carolina school district did not increase rates of cyber bullying. This was attributed to an awareness program that was run by the 12 schools involved. Kraft and Wang (2009) dispute this finding, noting that it is possible for cyber bullying prevention programs to improve the cyber bullying skills of attackers. Whether or not these programs are effective does not diminish the fact that this was of particular

concern to Anne, given her position at the school as one of the staff required to deal with such issues, should they arise.

Continuing with the classroom management theme, Charlie and Liz voiced concerns about students forgetting to bring iPads to class or school – or bringing them to school uncharged – and the disruptive impact this would have on the operation of a smooth class. The impact of damaged iPads was also raised as a concern by Charlie, Henry and Anne. Both of these concerns relate to the foreseen increase in reliance on the iPad to complete work; without the iPad, the student would not be able to complete the set work. A review of a 1:1 laptop program at the Denver School of Science and Technology (Zucker & Hug, 2007) found that, on any given day, 5% of students would not have a working laptop with them. If this statistic was replicated at Country campus, then the participants and school administration would need to develop strategies to deal with the resulting disruption.

Several of the participants were concerned about the impact of the trial on their ability to complete the expected curriculum in the allotted time. Six months into the trial, Henry reflected:

The fact that the device was new to myself, but also new to students and I knew that it was going to take out a bit of time initially to, I guess get the training out for the students but also for myself. I thought that would have a direct impact on the curriculum.

It was seen as important to not lose the academic rigor that the school community expected. Once again, it was thought that damaged, uncharged or forgotten iPads would directly impact this. The other component of the concern was that participants felt that students would need to be taught how to use the iPad and the apps in each of their classes. It was felt by the majority of the participants that this would encroach on valuable teaching time in which curriculum content should be covered. This concern was of interest, as students need to be taught how to use all the tools they are expected to use in any given class. This could present as an underappreciated notion because it is often assumed that students of this generation have an innate ability to use technology (see Prensky, 2009).

The school's decision to not allow printing from iPads was also seen as an initial concern by Liz, Charlie, Henry and Anne. In the past, student-typed work was always printed to be checked, to go on display and to keep a copy in workbooks. When the

participants first became involved in the iPad trial, this issue caused some frustration as the solution was not immediately obvious to those involved. There was a concern that students would be emailing work to teachers for printing and that this would add to workload.

The management of new app purchases for students was also seen as a potential issue by Liz and William. The school wanted to control the amount of money that families would be asked to spend purchasing apps. Some of the participants felt that this would restrict what they were able to do as some of the apps they wished to use were expensive. This was especially the case in some curriculum areas, such as music and science.

The final concern that participants initially had was the ability of the school's infrastructure to meet the demands that were about to be placed upon it. If there were regular issues connecting to the internet or other network resources, it would make it challenging to successfully integrate iPads into daily teaching. The need to get infrastructure right is a common theme in many studies (Barrios et al., 2004; Corn et al., 2010; DEECD, 2011; NSWDET, 2009; Holcomb, 2009; Milman et al., 2013; Palak & Walls, 2009; QLDDDET, 2011; Zucker & Hug, 2007). If students consistently cannot complete the work they are set due to technical reasons, then they – and their teachers – quickly become disillusioned with the technology and usage is reduced.

The concerns of the participants were summarised into three questions in the introduction to this chapter. The experiences of the participants, relating to these three questions, are discussed in Chapter 7. However, before these experiences can be examined, the potential opportunities of the 1:1 iPad trial as identified by the participants is explored in the following section (see 5.1.2).

5.1.2 POTENTIAL OPPORTUNITIES OF THE 1:1 PROGRAM

As previously stated, one of the participants' most common responses to the upcoming iPad trial was excitement about the teaching and learning possibilities. This excitement was generated by the potential educational opportunities that teaching in a 1:1 environment could facilitate for students. The potential advantages and opportunities that the participants talked about can be aptly summarised as each student having a device that provides them with an immediate connection to a wide variety of online resources through the internet, apps and the school's LMS.

Participants all envisaged that they would be able to utilise iPads to complete some current teaching tasks in a more streamlined fashion; such as the distribution of student work or assessment grades and marking the roll. The portability of the iPad was also mentioned by half the participants as something that had the potential to make their life easier; all their files would be accessible at all times. Selwood and Pilkington (2005) found that using technology to improve record keeping, data collection and preparation of teaching materials could facilitate extra time for teachers. Technology has changed since Selwood and Pilkington's finding and the majority of the participants were already using technology to complete these tasks. What was unclear to participants and myself at the beginning of the trial was how the addition of an iPad to their technological tool kit would manifest itself on a day-to-day basis and what time, if any, would be saved.

Mary noted that it would be good to have some technology in her drama classes as the space she teaches in has limited access to any other technology. Charlie, Henry and Anne commented that each student having a device that gives them access to a raft of resources would, more than likely, increase student engagement with their learning. There is a range of literature available on the use of well-planned ICT to affect student motivation and engagement levels. Spires, Lee, Turner and Johnson (2008) argue that students want to be engaged with school, they want to enjoy their time at school and see the use of technology as one way to do this. UK research into the motivational effects of ICT on pupils (Passey, Rogers, Machell, & McHugh, 2004), found that the use of ICT within the curriculum had positive implications for student motivation levels.

Alternatively, Selwyn (2006) found that there are a range of issues that affect student engagement with ICT in the classroom. He writes of a 'digital disconnection' between students and their schools. The three main reasons given for this disconnection are: the quality of the ICT resources found in the school, the restrictions placed on what could be accessed and the curriculum delivered using technology. Looking at these reasons for disconnection, it can be surmised that, if the infrastructure is adequate and students and staff can access their required online resources and a sound pedagogical base to an iPad activity exists, then the chances of students experiencing a disconnection between their outside-of-school-use and their classroom-use can be reduced.

The beginning of this section focused on the potential that participants saw in a 1:1 iPad environment in their classroom. Increased connectivity and engagement with the curriculum were seen as potentially positive outcomes of the trial and this generated

excitement. Despite the concerns that the participants felt, this excitement was the overwhelming attitude that participants had about the program beginning.

5.2 TEACHER WORKLOAD

Technology is often seen as a tool that will potentially save labour, reduce workloads and simplify life for the community in general. As mentioned in section 5.1.2, the participants of this study envisaged that the iPad trial would streamline aspects of their workloads. Incongruently, four out of the six participants described an increase in their workload with the implementation of the iPad trial. This section focuses on three different factors that impacted on the workload of participants, namely: communication with students, curriculum preparation and the 'age-old chestnut' of getting through an overcrowded curriculum in the allotted time.

5.2.1 COMMUNICATION WITH STUDENTS.

A commonly reported reason for an increase in workload was the increase in student connectivity. Half the participants described experiences of receiving emails from students with questions about homework tasks at a variety of times, especially later in the evening. Students had emailed prior to the iPad trial, but having the iPad made it easier for students to quickly send emails to their teachers. Unsurprisingly, removing the need to log into a webmail account (or otherwise making it easier to email teachers), resulted in teachers being contacted more frequently. While this has an obvious impact on the workload of participants, this increase was not always seen as a negative. Charlie, for instance, noted:

I like the idea of having an email beep at me and being able to respond, even if it is 9:00 at night, to a student who has forgotten how to do their homework, because it saves an issue later on. So, picking up issues at the point is what the iPad has helped us out with, and I think when you can pick up issues at the point, you have less issues ongoing.

Anne reported a similar situation, although for her, it was more than just getting emails at night. Due to her other roles within the school, Anne could occasionally go two days without seeing her students even though she was at school. Email allowed her to keep in contact with her students and answer any questions in a timely manner. Not all participants were as open to receiving emails out of school time as Charlie and Anne;

making it clear to their students that they may not get a response until the following day at school.

Henry and Anne described receiving more drafts of students' work than they had previous to the trial. This is facilitated by the online nature of the iPad. Students could now easily email work to their teacher for checking. One possible explanation for this is that Anne and Henry both teach older, more focused students in subject areas that can be more intensive. Liz and Charlie both teach Year 5 students who are less likely to complete many drafts of work. Mary and William both teach performing arts subjects that tend to involve less formal written work requiring checking.

The participants – with the exception of Mary – have all had student work emailed to them and, for some, this has presented another addition to their workload. As the school decided to not allow printing from the iPad, Liz, Charlie, Henry and Anne all reported printing off work students had completed. This can become an onerous task, especially when students do not send work in the correct format or without a name on the document. Participants, such as Liz, who were already comfortable with file formatting and using services such as 'Evernote' to collect student work, had fewer issues with this as they quickly trained their students to submit work in a format that would allow it to be processed quickly. As participants and their students became familiar with apps such as 'GoodReader' and 'PDF Expert', less work was sent for printing as it was marked through these apps.

5.2.2 CURRICULUM PREPARATION

The professional learning that participants undertook as part of the trial impacted on their workload. Participants who were not as familiar with the iOS environment found the transition challenging, especially learning how to use the iPad and developing meaningful activities to integrate into their curriculum at the same time. Some of the participants had limited curriculum and teaching resources available online prior to the introduction of iPads into their classrooms. The impact on their workload due to developing new and modifying existing resources, was initially very heavy. For example, Mary spent an extended period (almost 2 days) digitising all the scripts she used in her drama classes. She explains that it took time but there was a benefit for her students:

You can sort of think of it (digitising scripts) as being a couple of days work maybe... Them and me accessing what I wanted anywhere, (being able to access digital scripts quickly and easily) that's good. That's made an aspect of my job

easier, which is great, and you only use it when you want to use it, so it's been a good thing.

While this probably should not have been a surprise to the participants, some of these experienced educators found themselves searching for noticeably more time to apply to this part of their job – and normally after hours. Prior to the iPad trial, they easily integrated this part into their daily work life. Liz continues:

They've made it easier for me to get the results from the kids. It's made it harder for me to do my job in that I am spending more and more time planning, preparing, thinking about what I'm doing, even just managing student work.

As this was a trial, participants had to do a lot of their own research into what apps and online resources would be the most appropriate for their classes. Some participants spent significant amounts of time doing this. The issue appears to be that, within the Apple App Store, there are a multitude of apps that can be used in an educational setting. Finding, trialling and then, selecting the best app to use with a class, proved to be challenging for William and Liz. Exploring social media sites such as the #ipaded hashtag on Twitter (<https://twitter.com/search?q=%23ipaded>), participants found list upon list of suggested apps and activities. While this is a valuable source of potential resources to be used with students, the quantity of information available proved to be overwhelming and the quality sometimes questionable.

An increased workload is typically not a favourable outcome. Participants did report, however, that their workload decreased as the trial progressed and they became more comfortable with the iPad and the 1:1 environment, and built up the resources that they needed. It was also reported that the time spent creating and digitising these resources was worth the initial effort, as it streamlined their workflow later on. Mary's earlier quote is an example of this

5.2.3 PRESSURE ON CURRICULUM TIME

As mentioned previously (see 5.1.1), there were some initial concerns amongst the participants that valuable classroom teaching time would have to be given over to teaching students how to use the apps needed for their classes. This appeared to be almost a fear of the unknown with five of the six participants reporting that, while they did initially have to teach apps to students, this was not a significant impact on their workload for the following reasons:

1. The apps chosen by teachers were usually fairly straightforward to use;
2. While some participants spent longer preparing classes, their students were able to complete more of the curriculum, often going deeper into the material than had previously been possible. Anne recounted the following example from her Year 7 English class:

'...even when we are reading a book and then they ask me, where's that? We hop on and we look for the Google map and do a little virtual walk, come back, look up definitions and things.'

3. The teaching of how to use the app is often integrated into the teaching of the curriculum concept being covered.

The level of support students provided each other was also higher than expected. They were open to accepting assistance from others, including across perceived social boundaries. Some of the participants were surprised at the level of support students provided to their peers and their teachers. They also noted that, often, the most helpful students were not ones who readily volunteer information to the class. Henry explains further:

One of the really good things about it is that the student, the typical student who might know a fair amount about it (iPads) is not normally one of the students who would be verbalising stuff. It gives them an opportunity to show off their skills and talents and all of a sudden students who might not have known the particular person very well in their social group or wherever is like hey, this student knows so much about this. Let's find out a bit more about it and they're building relationships that way.

Participants also reported that students' organisational skills generally improved through the use of iPads. There was an observed decrease in the amount of time wasted due to physical resources being lost by students. This was achieved by worksheets being completed digitally and using apps such as 'Notes' to keep track of tasks.

Overall, it appeared that most of the participants saw the trade-off between the amount of work that students were able to complete and the time spent teaching students how to use the iPad, as a valuable trade.

5.2.4 PROFESSIONAL LEARNING

Professional learning was discussed in depth in Chapter 4, and it is important that any new program introduced to a school should include sufficient training for the staff who will be integrating the new technology into their classroom practice. This training was another pressure on the workload of the participants.

While the participants found the initial training to be somewhat haphazard in its effectiveness, it did give them a starting point. What became apparent through this research is that additional strategies to support staff during the initial stages of a 1:1 iPad program are advisable. The most crucial of these is more time. All the participants spoke about the time it took to find new apps, plan lessons that included the use of iPads and to just gain an understanding of how to effectively use the device.

From the feedback of participants, it is clear that teachers who are enthusiastic about the introduction of the technology into their classes will spend the extra time looking for apps and dedicate time to thinking about how they are going to effectively use the technology with their students. Liz and William were illustrative examples of this: they were more likely than the other participants to find something new and then, try it with their classes. On the other hand, Mary was able to get to a point where she could integrate the new technology into her classes to a point where she was satisfied, so that time spent exploring different options and possibilities was reduced. While all participants wanted to use the technology with their students, when workloads increased, the exploration and experimentation with iPads decreased.

From an organisational point of view finding more time for staff to plan and implement an effective iPad program can be a challenge, but it is one that is worth overcoming. Howard (2009) found that it was important for educational institutions to manage the risks teachers perceived as being connected to using technology in classes. These risks include the loss of instruction time due to technical issues, increased school focus on results of standardised testing and staff self-efficacy about the use of technology. Not managing these risks leads to a decrease in teachers integrating technology into their classes. Giving staff more time – providing it is directed and structured – is one way that a school can overcome some of these risks. The participants in this study did have some time for professional learning, but would have benefited from more time to explore the possibilities and opportunities that the device presented.

5.3 CLASSROOM MANAGEMENT

Managing student behaviour and the potential distraction of the iPad was a common cause of concern at the beginning of the trial (see 5.1.1). Half of the participants found that the amount of time students spent misusing the iPad was about what they expected. These participants all recognised that this was an issue that they were actively aware of in their classrooms. William says:

It's the cupcake factor, they've got these cupcakes in front of them, and we tell them not to eat them, you know; then you have got these marvellous, amazing, state-of-the-art free games, they're right in front you, don't use them.

Other participants spoke about the increased suspicion they had about what students were doing when they were working on their iPads. They felt the use of the iPad increased the possibility that students would be off-task and, therefore, unproductive in terms of their schoolwork.

For the majority of the participants this issue turned out to be a manageable one, but one that they had to be aware of throughout the course of their classes. The participants in this study were all skilled and experienced teachers. I can see how the use of iPads in classrooms could increase the time students would spend off-task if the teacher was not as confident with their classroom management.

Cyber bullying was also raised as a potential issue by at least one of the participants. As previously stated, there was a low rate of occurrence of this previously at the campus and this did not greatly increase. The school continued to manage this issue through standard disciplinary methods and educate students through Wellbeing classes.

It is important to mention here the role the guidelines set by the school played in keeping this issue manageable. Students were expected to have their iPads with them in every class, increasing the chance of students being distracted from their work. However, from the beginning of the trial, the iPads were considered by staff as a support tool for the learning taking place in the class – like a calculator in maths class. Students were encouraged to open their iPads, complete the tasks that they were set and then, close them again. I noticed this in all the participants' classes. The message that 'there is nothing wrong with an iPad not being used all the time' was delivered to participants consistently throughout the initial training and again, throughout the trial. This study did not investigate the potential disconnection between the guidelines set by the school and the message delivered to the students by the teachers. What is clear is

that, for the most part, the participants continued to reinforce the message to their students that the iPad was a tool for their learning; yes, students were given opportunities to use the iPads for games and similar pastimes, but this was done during non-learning times.

The introduction of iPads into the participants' classrooms elicited a number of concerns that were largely based on unknown factors about the trial. Many of these concerns were quickly laid to rest once the program commenced and the participants became comfortable with the device and how it could be used. One of the main concerns was the potential impact on workload and this chapter investigated this in some detail. The participants appeared to be thankful that the common concern of the iPad taking away time from their curriculum turned out to be unfounded; in fact, as discussed, the opposite generally occurred; more content could be covered and in greater detail with the addition of iPads to the classroom. In the Chapter 6 this will be explored in more detail and I discuss how the iPad worked well for the participants and what aspects of the device could be improved on.

CHAPTER 6 – TECHNICAL IMPLICATIONS OF 1:1 IPAD PROGRAMS IN SCHOOLS

As the two previous chapters have shown, the 1:1 iPad trial produced a range of mixed reactions and experiences from the staff involved, including the six participants in this study. This chapter examines some of the technical implications of 1:1 iPad classrooms, from the perspective of study participants who have observed the iPad in classrooms and the technical infrastructure required to maximise its potential. First, the technical limitations of the iPad that add or detract from the participants' ability to do their jobs effectively are explored (see 6.1); this device is different to a computer and, for those unfamiliar with its capabilities, this can be a confronting issue. As such, it is an issue worthy of further exploration. The second focus of this chapter is the ability of technical infrastructure to support the increased demands caused by the introduction of a 1:1 iPad program (see 6.2). Network capacity was highlighted as a concern by the study participants before the commencement of the trial and it is important that educational institutions get this right if a 1:1 program is to be implemented successfully.

6.1 TECHNICAL ASPECTS OF THE IPAD

For the most part, participants were positive about the iPad as a device to use in the classroom, compared to desktop and laptop computers. They found that the use of iPads in a 1:1 environment had many advantages over the desktop computers, previously used with their classes. The advantages included the 'instant' access to online resources, the almost instantaneous boot time, the built-in camera and the general reliability of the device. These advantages are discussed further below (6.1.1), as well as the issues and challenges that the participants had with the iPad (6.1.2).

6.1.1 WHAT WORKED WELL WITH THE IPAD

First, the iPad gave each student almost instant access to online resources from the internet and 'Blackboard', the school's learning management system. Each participant described that they had utilised this function to improve their teaching in some way. Mary, for example, spent a number of days digitising the majority of the scripts she would need for her drama classes. While this was time consuming, it meant that her students had access to important documents through 'Blackboard'. Mary spoke about how this initial investment of time allowed her to use her time more effectively on a

daily basis. Work was already prepared and available for students to use anytime. The ability to quickly access information was mentioned by other participants, too. Anne noted:

The instant availability of it [information]. You can send things from anywhere; you can access things from anywhere... The kids get them on the internet straight away. I think the pace has improved because of it.

Combining the iPad with the apps available through Apple's App Store, provided a resource for the participants to use across the subjects they teach. When combined with almost instant access to resources found online, participants quickly found themselves regularly utilising the device with their classes. The ease in which most participants and their students developed the ability to use the iPad and apps contributed to this positive uptake. In section 5.1.1, the participants' concerns about the amount of time it would take to teach students how to use the iPad and appropriate apps in the expected manner was discussed. These concerns were largely unfounded, with the majority of the participants finding that the iPads had saved them some curriculum time. Six months into the iPad trial, Liz was asked about this concern:

Time is saved because in the past if you went onto a computer you'd be waiting sometimes up to ten minutes for a computer to boot up it might boot up after five minutes and then would have to be rebooted or the student would lose their work or they wouldn't get on to the network. The bottom line really is the time that you lose for teaching new apps is saved in other ways.

Henry gave another example:

We're getting through more things at a higher level and achieving greater outcomes because of the iPad. Prime example of that was that the safety poster at Year Seven, so it was introduction to science at Year Seven. We discuss and the students produce a poster, this is last year, a poster on safety aspects. Do's and don'ts of the safety lab and produce a fantastic poster with some dot points and some drawings and things like that. This year, with the use of the iPad, they're able to write a script in notes, collaborate with other students, decide what aspect of the safety in the lab they'd like to do and produce a video which was then shown to their peers so not only did the students who produced the video learn from it, but their peers also learned by watching it... We were able to do that in two periods which is less time than we would have spent on a poster.

The above quote from Henry is also an example of one of the most used features of the iPad. The built-in camera and associated video editing apps allowed the participants to integrate video making into their curriculum with far greater ease. This provided students with another avenue to demonstrate their understanding of the curriculum where appropriate. Liz, Charlie, Henry and Anne also reported the camera being used for organisational purposes by their students who regularly took photos of the whiteboard before leaving class so that they could either complete unfinished work or use the images as part of their exam preparation and study. It was this quick, incidental use that seemed to make the iPad preferable to laptops.

Liz's comment also highlights the students' ability to quickly and easily save and store their work when using the iPad. Charlie also referred to this as a positive of the iPad, however he also spoke about the ongoing concern about the potential for the device to be lost or fail in some way and the impact this would have if students lost all their work.

6.1.2 WHAT THE IPAD COULD DO BETTER

As a device the iPad was generally considered to be good for how Castle College wished the students to use it, as Anne explains:

Speaking from my perspective as an English teacher, we have a balance of textbooks; we still read from the textbooks, we read from things that are on our iPad. We film work when I think I gave you an example of when we were doing a debate. I use YouTube to look up a sample of the debate to show the kids that someone else had done which was terrific. They then did their debate and filmed it and then they had their notes on their iPad. We definitely balance out the use of it but we use our English textbooks as well.

However, there were three main concerns amongst the participants about the limitations that the device had. These concerns included: the impact of various file formats, file management and using the iPads with 'Blackboard'.

The file format issue relates to the iPads inability to play Flash files. This meant that a lot of previously used online materials could not be used by the students. This was frustrating for participants like Liz who had a large collection of resources that she used on a regular basis that she could no longer easily use with her students. Finding replacement resources, while available, was a time-consuming and frustrating process.

The file format was also an issue affecting participants sharing work across different platforms. Work sent to the participants by students often had to be resent as the Windows-based, school-issued laptops for teachers could not open iPad documents created in the 'Pages', 'Keynote' or 'Numbers' apps. This is not an uncommon problem and easily avoidable through more training for the students, so that their work is sent in the correct format. However, during the first six months of the iPad trial, this was a source of frustration for half of the participants.

File management and submitting work created on the iPad for assessment during the iPad trial was seen as a major issue amongst the participants; all experiencing issues accessing student work (In 2013, Castle College largely overcame this through the use of a WebDAV system called 'eLocker Suite'). Email is one of the easiest ways to send files from an iPad. Unfortunately, emails are restricted to 20Mb by the school. And while many apps that are used by the students work well with online storage services such as 'Dropbox', this could often prove to be a cumbersome process. The other problem was that Apple's own apps (such as 'Keynote' and 'Pages') didn't allow users to access these services. There were solutions to this issue, but none proved straight forward. As the participants integrated the iPads further into their curriculum – and staff needed to refer back to this work to assist in report writing – this issue had a bigger impact.

The final technical frustration with the iPad that participants discussed was that the devices did not work well with 'Blackboard', the school's learning management system. Accessing the site could be cumbersome and participants felt that it should have been easier. With the exception of images, it was not possible for staff to upload content to the 'Blackboard' site from the iPad, even using the specifically designed 'Blackboard' app, created for the iPad. As participants increased their reliance on the iPad, they stopped carrying around their laptops, making it more difficult to upload documents if the demand arose. All participants reported using email instead – a result that Castle College was keen to avoid due to the demands this placed on network infrastructure.

6.2 SUPPORTING INFRASTRUCTURE

Participants' views of the reliability of the supporting infrastructure (such as wireless network and internet connection and filtering) were surprisingly positive. The participants appreciated the fact that students could, for the most part, log in and begin using their iPads with limited technical issues. This was an improvement when compared to recent experiences with technology throughout the campus. There were,

however, some sources of frustration related to the infrastructure, including: connection to the wireless network, proxy server interactions with the iPad, password management and printing.

One of the first issues raised by participants was dealing with students who were unable to access online resources during a lesson. There were two main causes of this issue:

1. Students not having their iPad correctly configured, including expired passwords and
2. Network issues, including black spots, proxy settings, and limited outages, preventing students connecting to online resources.

Both these issues were far more prevalent early in the trial and were dealt with as they presented. One example of a network issue was the space where drama classes were held, having limited network coverage throughout Term 1. This was a reoccurring problem for Mary's classes as the limited network access caused the iPads to not work as she needed them to. Another, similar issue, was how the proxy server interacted with the iPads. Each device would prompt the user for their username and password several times when accessing any internet resource (this was not an isolated issue, with many organisations worldwide experiencing the same problem).

Settings being changed, either on local servers or by individual websites, also created frustrations for the participants. The most oft-mentioned example of this was that YouTube would work one day and then not on another, in a seemingly random way. Investigation into this issue found that a setting changed by the website created a conflict with the school's proxy server; thereby blocking the site. The restrictions and filtering that the school places on internet access also proved cumbersome. While seen as necessary, some participants found it frustrating that an online resource that they discovered at home, did not work at school. For example, an app called Sock Puppets was unable to be used because the network would not allow the app to connect to the online content it required.

Passwords proved to be a challenge for some students. This was especially so for some of the younger students who may have viewed emails reminding them to change passwords as mere suggestions – not something that needed action with diligence. As students became more familiar with the device, a larger number of them were able to

independently manage their network settings and, if they couldn't, someone else in the class was usually able to help them.

Printing was another issue that participants raised as a concern, both initially (see 5.1.1) and as the trial progressed (see 5.2.1). iPads are a print-enabled device, but the school made the decision not to configure this option. Some participants found that this was not a major inconvenience. However, others felt that this decision made their jobs more challenging.

Most participants found a solution to this printing problem by emailing the document to themselves, booting up their laptop, opening their email and then, printing the document. This 'double handling' was seen as time consuming and unnecessary. Mary commented, 'Well if I want to double handle, I'll use the iPad'. Four of the six participants reported similar experiences.

As with any technological initiative, there were positive and negatives about the iPad as a device and the supporting infrastructure. The participants reported that, generally speaking, the negatives became frustrations that they begrudgingly worked around, while the positives helped them to educate their students, providing opportunities to streamline processes and increase the relevance of the material being covered.

CHAPTER 7 – CONCLUSION

This thesis is a record of my attempt to gain a better understanding of teachers' attitudes towards the use of iPads in their classrooms and their experiences working in a 1:1 environment. This chapter opens with a response to each of the three research questions that were developed to frame this study (see 7.1). This is followed by an examination of the limitations of the study, the contributions made to existing research and opportunities for further research (see 7.2).

7.1 QUESTIONS ADDRESSED IN THE STUDY

7.1.1 QUESTION 1

This study investigated the experiences of six middle school teachers as they navigated their way through the first six months of a 1:1 iPad trial. Given that the aim of the trial was to gain a better understanding of the teachers' experiences working in a 1:1 iPad trial, the first research question asked:

What advantages and/or challenges do teachers experience when using iPads in middle school classrooms?
--

This study found that in this case, using iPads in middle school classrooms increased the possibility of covering more of the curriculum with a greater level of detail (see 5.2.3 and 6.1.1). As Henry explained, 'We're getting through more things at a higher level and achieving greater outcomes because of the iPad.' This is in direct contrast to the initial concerns of the participants (see 5.1.1) who feared that valuable time with their students would be spent teaching the students how to use the device. Class time was given to the teaching of different ways to use the iPad, just as time would be spent teaching a new mathematical formula or writing genre. Charlie concluded:

You might introduce it. This is the same as any program. If you are doing a work program that was not an iPad program, then you would spend a portion of the start of a session explaining it. I do not think you spend any more time explaining it.

An increase in communication with the wider school community was found to be both an advantage and challenge (see 5.2.1). If a teacher is willing and able to answer emails from students whenever the students have trouble with some part of their work, be that

at 11:15am on a Wednesday or 11:15pm on a Saturday, then this is an advantage for that student's learning; they don't have to wait till the next class to receive the assistance they need. Alternatively, answering student emails at odd times increases workload and has the potential to develop a culture where students expect to receive responses from every teacher no matter what day or time the email is sent. This would have direct ramifications on the personal lives of teachers. This is not something that has occurred in this study but the potential was noted by at least one participant.

In a similar vein, workload expectations (see 5.2) were seen as one of the biggest challenges facing the participants of this study. It is important that educators familiarise themselves with the iPad, related apps and appropriate teaching strategies to use the device with their students, however, during this study it became apparent that implementing a 1:1 iPad trial has the capacity to impact on the available time teachers have to effectively complete their other duties.

7.1.2 QUESTION 2

Having looked at the advantages and challenges teaching in a 1:1 iPad trial can create I thought it was important to investigate what teachers thought about the trial – do the challenges outweigh the advantages? To address this, a second research question was generated:

What do teachers think about the integration of iPads into their classrooms?
--

From the outset the participants of this trial recognised the potential benefits of the iPad trial (see 5.1.2) as well as the challenges (see 5.1.1). Throughout the study participants remain generally positive about the integration of iPads into their classrooms. In addition to the previously mentioned workload concerns, there were the challenges and frustrations that come with implementing any new technology into a school (see 6.1.2). However, the participants remained positive about their experiences implementing the iPad trial. Delving further into this point, the participants in this study all strive to facilitate the best possible outcome for their students and all work extended hours on a regular basis. Not every teacher displays this level of commitment to their students but it is this commitment that sees them answering emails late at night. Doing this allows the student to continue learning; ultimately the participants took on the extra workload because they felt it was valuable for the learning of their students.

This value was recognised in a number of different ways; for Mary it streamlined the delivery of content in a teaching space that previously had limited access to technology. Liz found that the connectedness allowed her students to present and submit work with greater ease; while Charlie experienced an increase in communication and organisation with his Year 5 boys. William found that integrating iPads into his music class helped to engage students and Henry found that his science classes were able to go into greater depth by using the variety of resources available online. Finally, Anne, who started in the iPad trial with somewhat limited technological abilities, found the iPad easy to use in meaningful ways – she often spoke about using the iPad to add context to a discussion that was occurring in her classes.

In summary, the participants of this study found that while there is a noticeable increase in workload during the initial stages of a 1:1 iPad trial, this increase is worthwhile due to the benefits to the students in the classes they teach.

7.1.3 QUESTION 3

While investigating the thoughts, opinions and experiences of the participants implementing a 1:1 iPad trial it was also possible to investigate exactly how the iPad was used by the participants, hence the third research question:

What is the relationship between iPad technology and the intended curriculum in these classrooms?

From the outset Castle College did not intend the introduction of a 1:1 iPad trial to dramatically change the way teachers actually taught their students (see 3.4). Generally the iPad is viewed by the participants as a tool to support student learning. Charlie summarised the situation:

I never looked at the iPads as being anything that would change the way I teach. It is only an add-on to the way I teach, so it has made things more efficient. It is easier to take notes. It is easier for them to convert first draft into a second draft by typing it up without having to organise computer time. It is easier for them to catch up on work by taking a photo and doing it at home. It has made it more efficient.

Participants reported that iPads were used to deliver information to students through a variety of apps, webpages, 'Dropbox', email, and the LMS 'Blackboard'. Previously students had access to some of this content, normally in paper format; digitising this

information made it easily available for students when they needed it but it did not change the content of the information, just the platform. Participants also reported that students used the iPad to create content during classtime. Examples of this include 'Keynote' presentations, 'Pages' documents, and a variety of multimedia creations, mindmaps and eBooks.

In this study the relationship between iPad technology and the intended curriculum was that the former was used to enhance and support the latter; the teaching strategies that the participants used did not change greatly, they were tweaked to take advantage of newly available resources. Henry's example of changing a science safety poster into a movie (see 6.1.1) is an example of this – the focus of the lesson did not change, the teaching and discussion of the key concepts did not change, the change was in how students displayed their understanding of key concepts.

7.2 LIMITATIONS OF THIS STUDY, CONTRIBUTIONS TO EXISTING RESEARCH SUGGESTIONS FOR FUTURE RESEARCH

While efforts have been made to complete a qualitative study that is thorough, some limitations do exist. Exploring these limitations creates an opportunity for others to build on this study. The first limitation is related to my place within the research. Even taking O'Toole and Beckett (2010) observer-participant position (see Chapter 3) and the steps taken to remove any bias that I may have (see 3.6.2, 3.8 and 4.1) into account, my role at Castle College, my insider status (Merton, 1972), had the potential to limit this study, either through the participants limiting what they may contribute or through my inadvertently misinterpreting the data. Conversely, as discussed in Chapter 3, my insider status also benefited the study as I was able to utilise my knowledge and understanding of Castle College and the participants to delve deeper into issues. Ultimately though, if this study was implemented by another researcher there is a likelihood that the results may be interpreted differently.

The timeframe of this study is another limitation. While six months was a reasonable timeframe in which to investigate the initial stages of the iPad trial, a longitudinal study would have the capacity to generate a more detailed picture of the experiences of teachers. The number of interviews completed as part of this study is also a limitation. Conducting more interviews with the participants would have potentially generated additional insights and understandings.

The range of participants in this study can be considered a limitation. While the number of participants was appropriate for a study of this size, the study would have benefited from the inclusion of graduate teachers and participants below the age of 30. The lack of representation from the mathematics faculty can also be considered a limitation. Where this lack of generalisability may be seen as a limitation this study, Lincoln and Guba's (1985) notion of transferability allows for this study to be modified slightly and then used in similar situations.

Despite these limitations this study has contributed to with greater discussion about 1:1 iPad programs in education settings. Due to the infancy of the iPad at the commencement of this study, limited research into the use of iPads in education contexts exists, especially when looking at how using these devices in the classroom alters the teaching experience. The findings of this study works toward addressing this 'gap' in the research.

The findings of this study also add to the discussion about the importance of teacher professional learning when implementing new technological initiatives. The experiences of these teachers at Castle College are, largely, in correlation with the findings of the National Mapping of Teacher Professional Learning Project (Doecke et al., 2008). The study does, however, bring a new slant to the discussion in the form of introducing technological domestication theory and the potential to use this to sculpt and target individual professional learning experiences for educators. This however was not the main focus of this study, and further investigation into this area, including developing a matrix of behaviour and a skills checklist, would be beneficial.

As discussed from the outset of this thesis (see 1.3) this study did not set out to investigate teacher self-efficacy about their use of iPads; however, this is an area that would be worthy of further investigation – especially to compare this to teacher self-efficacy about technology in general. Finally, a larger scale study of teacher and other stakeholder experiences in 1:1 iPad programs that encompasses a variety of educational settings and teacher backgrounds would add more to this discussion.

7.3 CONCLUDING STATEMENT

In this study I set out to investigate what a group of middle school teachers experienced when implementing a 1:1 iPad trial. Findings from this study show that despite the increase in workload, the benefits of each student having a device that they can readily access online information or create their own content on, make for an overall rewarding

experience for the educators involved. Are 1:1 iPad programs worth the investment of time and money? This study demonstrates that, from a teacher's point of view, they probably are. Provided they are well planned, there are clear expectations about how they will be used within the existing curriculum and they are supported by school administrators, the teachers who implement them and the community that benefits from them.

REFERENCES

- Australian Curriculum, Assessment and Reporting Authority. (2013). *My School*. Retrieved September 9th, 2013, from <http://myschool.edu.au>
- Adler, P. S. (2008). Technological determinism. In S. R. Clegg & J. R. Bailey (Eds.), *The international encyclopedia of organization studies*. Thousand Oaks, CA: SAGE Publications, Inc.
- Apple Inc. (2010). *Apple reports third quarter results*. Retrieved April 19, 2012, from <http://www.apple.com/pr/library/2010/07/20Apple-Reports-Third-Quarter-Results.html>
- Banister, S. (2010). Integrating the iPod Touch in K-12 education: Visions and vices. *Computers in the schools*, 27(2), 121-131.
- Barrios, T., Ambler, J., Anderson, A., Barton, P., Burnette, S., Feyten, C., . . . Yahn, C. (2004). *Laptops for learning: Final report and recommendations of the Laptops for Learning Task Force*. Florida.
- Bebell, D., Russell, M., & O'Dwyer, L. (2004). Measuring teachers' technology uses: Why multiple-measures are more revealing. *Journal of Research on Technology in Education*, 37(1), 45-63.
- Bennett, S., Bishop, A., Chang, R., Dalgarno, B., Gray, K., Judd, T., . . . University, C. S. (2008). *Educating the net generation: A handbook of findings for practice and policy*. Strawberry Hills NSW: Australian Learning and Teaching Council.
- Bimber, B. (1994). Three faces of technological determinism. In R. Smith & L. Marx (Eds.), *Does technology drive history? The dilemma of technological determinism*. (pp. 79-100). Cambridge, MA.: MIT Press.
- Brice, A. (2011). iPads : transferring or transforming education? *Teacher*(220), 30-32.
- Caldwell, R. M. (1980). Improving learning strategies with computer-based education. *Theory Into Practice*, 19(2), 141.
- Cauchi, S. (2011). *Schools ponder if an Apple a day keeps ignorance at bay*. Retrieved July 16, 2012, from <http://www.theage.com.au/victoria/schools-ponder-if-an-apple-a-day-keeps-ignorance-at-bay-20110730-1i5kr.html>
- Chander, D. (1995). *Technological or media determinism*. Retrieved January 20, 2012, from <http://www.aber.ac.uk/media/Documents/tecdet/tecdet.html>
- Coll, R. K., & Chapman, R. (2000). Choices of methodology for cooperative education researchers. *Asia-Pacific journal of cooperative educational technology*, 1(1), 1-8.
- Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America*. New York, NY: Teachers College Press.
- Corn, J. O., Oliver, K. M., Hess, C. E., Halstead, E. O., Argueta, R., Patel, R. K., . . . Huff, J. D. (2010). A computer for every student and teacher: Lessons learned about planning and implementing a successful 1:1 learning initiative in schools. *Educational Technology*, 50(6), 11-17.
- Creswell, J. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (Second ed.). Thousand Oaks, CA: Sage Publications.
- Denzin, N. K., & Lincoln, Y. S. (2003). The discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues* (2nd ed., pp. 1 - 46). Thousand Oaks, CA: Sage Publications.
- Department of Education and Early Childhood Development. (2011). *iPads for Learning*. Retrieved March 12, 2012, from <http://www.ipadsforeducation.vic.edu.au/>
- Department of Education, Employment and Workplace Relations. (2008). *Strategic plan to guide the implementation of the Digital Education Revolution initiative and related initiatives*. Canberra, Australia: DEEWR
- Department of Science and Training. (2005). Student motivation and engagement. *Schooling issues digest* (Vol. 2). Canberra, Australia: DEST.

- Doecke, B., Parr, G., & North, S. (2008). *National mapping of teacher professional learning project: Final report*. Canberra, Australia: Retrieved from <http://apo.org.au/sites/default/files/National%20Mapping%20of%20Teacher%20Professional%20Learning%20Project.pdf>
- Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education*, 39(3), 263-286.
- Dunleavy, M., Dexter, S., & Heinecke, W. F. (2007). What added value does a 1:1 student to laptop ratio bring to technology-supported teaching and learning? *Journal of Computer Assisted Learning*, 23(5), 440-452.
- Dwyer, D. C. (1995). A report on 10 years of ACOT research. Cupertino, California: Apple Inc.
- Ellul, J. (1962). Ideas of technology: The technological order (J. Wilkinson, Trans.). In C. F. Stover (Ed.), *Proceedings of the Encyclopaedia Britannica Conference on Technological Order* (Vol. 3, no. 4, pp. 394 - 421). Detroit, MI: Wayne State University Press.
- Elmer-DeWitt, P. (2012). Transcript: Apple CEO Time Cook at Goldman Sachs. *CNN Money*. Retrieved July 16, 2012, from <http://tech.fortune.cnn.com/2012/02/15/transcript-apple-ceo-tim-cook-at-goldman-sachs/>
- Feinberg, T., & Robey, N. (2009). Cyberbullying. *The Education Digest*, 74(7), 26-31.
- Foote, C. (2012). Learning together: The evolution of a 1:1 iPad program. *Internet@Schools*, 19(1), 15.
- Garner, D. (2012). Research: Laptops do not increase academic achievement in reading and writing. Retrieved June 9th, 2013, from <http://educationviews.org/research-laptops-do-not-increase-academic-achievement-in-reading-and-writing/>
- Gawelek, M. (2011). Mobile perspectives on iPads: Why Mobile? *Educause Review*, 46(2), 28-30.
- Grimes, D., & Warschauer, M. (2008). Learning with Laptops: A multi-method case study. *Journal of Educational Computing Research*, 38(California), 305-332.
- Grint, K., & Woolgar, S. (1997). *The machine at work: Technology, work and organization*: Cambridge, UK: Polity Press.
- Gustin, S. (2012). How many iPads can Apple sell? *Time*. Retrieved July 16, 2012, from <http://business.time.com/2012/03/16/how-many-ipads-can-apple-sell/>
- Haddon, L. (2006). The contribution of domestication research to in-home computing and media consumption. *Information Society*, 22(4), 195-208. doi: 10.1080/01972240600791325
- Hall, G. E. (2010). Technology's achilles heel: Achieving high-quality implementation. *Journal of Research on Technology in Education*, 42(3), 231-253.
- Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the process*. Albany, NY: State University of New York Press.
- Heilbroner, R. (1967). Do machines make history? *Technology and Culture*, 8(3), 335-345.
- Heilbroner, R. (1994). Technological determinism revisited. In R. Smith & L. Marx (Eds.), *Does Technology Drive History? The Dilemma of Technological Determinism*. (pp. 67-78). Cambridge, MA: MIT Press.
- Holcomb, L. B. (2009). Results & lessons learned from 1:1 laptop initiatives: A collective review. *TechTrends*, 53(6), 49-55.
- Howard, S. (2009). *Teacher change: Individual and cultural risk perceptions in the context of ICT integration*. University of Sydney, Sydney, Australia. Retrieved from <http://hdl.handle.net/2123/5340>
- Hu, W. (2007). Seeing no progress, some schools drop laptops. *The New York Times* Retrieved April 16, 2012, from

- <http://www.nytimes.com/2007/05/04/education/04laptop.html?pagewanted=all>
- Jennings, G. (2012). Excellent academic results with Trinity's iPad pilot group. Retrieved May 26, 2012, from <http://ipadpilot.wordpress.com/2012/02/13/excellent-academic-results-with-trinitys-ipad-pilot-group/>
- Kervin, L., Vialle, W., Herrington, J., & Okely, T. (2006). *Research for educators*. South Melbourne, Australia: Cengage Learning.
- Kraft, E. M., & Wang, J. (2009). Effectiveness of cyber bullying prevention strategies: A study on students' perspectives. *International Journal of Cyber Criminology*, 3(2), 513-535.
- LaMaster, J., & Stager, G. S. (2012, February). Should students use their own devices in the classroom? *Learning & Leading with Technology*, 39, 6+.
- Larkin, K. (2011). You use! I use! We use! Questioning the orthodoxy of one-to-one computing in primary schools. *Journal of Research on Technology in Education*, 44(2), 101-120.
- Lemke, C., Coughlin, E., & Reifsnider, D. (2009). *Technology in schools: What the research says: An update*. Culver City, CA: CISCO.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications, Inc.
- Lincoln, Y. S., & Guba, E. G. (2003). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues* (2nd ed., pp. 253 - 291). Thousand Oaks, CA: Sage Publications.
- MacKenzie, D., & Wajcman, J. (1999). Introductory essay: the social shaping of technology. In D. MacKenzie & J. Wajcman (Eds.), *The social shaping of technology*. Buckingham, UK: Open University Press.
- Merton, R. (1972). Insiders and outsiders: A chapter in the sociology of knowledge. *American Journal of Sociology*, 78(1), 9-47.
- Milman, N. B., Hillarious, M., O'Neill, V., & Walker, B. (2013). Going 1:1 with laptop computers in an independent, co-educational middle and high school. In J. Keengwe (Ed.), *Pedagogical applications and social effects of mobile technology Integration* (pp. 156-174): IGI Global.
- Mumford, L. (1972). Technics and the nature of man. In C. Mitcham & R. Mackey (Eds.), *Philosophy and technology: Readings in the philosophical problems of technology* (pp. 77-85). New York, NY: The Free Press.
- Murray, O. T., & Olcese, N. R. (2011). Teaching and learning with iPads, ready or not? *TechTrends*, 55(6), 42-48.
- Muspratt, S., & Freebody, P. (2008). *Students' perceptions of the characteristics of 'good' and 'poor' digital learning objects*. Paper presented at the AARE 2007 International Education Research Conference, Fremantle.
<http://www.aare.edu.au/07pap/mus07403.pdf>
- New South Wales Department of Education and Training. (2009). *One-to-one computing: Literature review*. Sydney, Australia: NSWDET. Retrieved from [https://www.det.nsw.edu.au/media/downloads/strat direction/schools/derns w/rrql/lit review.pdf](https://www.det.nsw.edu.au/media/downloads/strat%20direction/schools/derns%20w/rrql/lit%20review.pdf)
- New South Wales Department of Education and Training. (2010). *One-to-One Computers in Schools: 2010 Literature Review*. Sydney, Australia: NSWDET. Retrieved from http://www.dec.nsw.gov.au/detresources/lit_review10_azjZFKgtVB.pdf
- Northern Territory Department of Education and Training. (2011). NT Cloud iPad Trial. Darwin, Australia: NTDET. Retrieved March 12, 2012, from <http://ntipadtrial.org/>
- O'Toole, J., & Beckett, D. (2010). *Educational research: Creative, thinking and doing*. South Melbourne: Oxford University Press.

- Oliver, M. (2011). Technological determinism in educational technology research: Some alternative ways of thinking about the relationship between learning and technology. *Journal of Computer Assisted Learning*, 27(5), 373-384. doi: 10.1111/j.1365-2729.2011.00406.x
- Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, 41(4), 417-441.
- Passey, D., Rogers, C., Machell, J., & McHugh, G. (2004). The motivational effect of ICT on pupils. Nottingham: Department of Educational Research, Lancaster University.
- Pinch, T. J., & Bijker, W. E. (1987). The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other. In W. E. Bijker, T. P. Hughes & T. J. Pinch (Eds.), *The social construction of technological systems: New directions in the sociology and history of technology*. (pp. 17-50). Cambridge, MA: MIT Press.
- Plato. (1973). *Phaedrus and Letters VII and VIII*. New York: Penguin Books.
- Prensky, M. (2009). H. Sapiens Digital: From digital immigrants and digital natives to digital wisdom. *Innovate*, 5(3).
- Queensland Department of Education and Training. (2011). *iPad trial: Is the iPad suitable as a learning tool in schools?* Brisbane, Australia: QLDDDET. Retrieved from <http://education.qld.gov.au/smartclassrooms/pdf/ipad-trial.pdf>
- Riekert, M., & Timson, L. (2006). Get smart. *The Age*. Retrieved April 14, 2012, from <http://www.theage.com.au/news/technology/get-smart-for-school/2006/02/07/1139074232908.html?page=fullpage#contentSwap2>
- Schagen, S. (2011). *Implementation of the New Zealand curriculum: Synthesis of research & evaluation*. Retrieved from http://www.educationcounts.govt.nz/_data/assets/pdf_file/0007/89350/963_Implementation-Synthesis-28022011.pdf
- Selwood, I., & Pilkington, R. (2005). Teacher workload: using ICT to release time to teach. *Educational Review*, 57(2), 163-174. doi: 10.1080/0013191042000308341
- Selwyn, N. (2006). Exploring the 'digital disconnect' between net-savvy students and their schools. *Learning, Media and Technology*, 31(1), 5 - 17.
- Selwyn, N. (2011). Making sense of young people, education and digital technology: the role of sociological theory. *Oxford Review of Education*. doi: 10.1080/03054985.2011.577949
- Silvernail, D. L., & Gritter, A. K. (2007). *Maine's middle school laptop program: Creating better writers*. Gorham, Maine: Maine Education Policy Research Institute & University of Southern Maine.
- Silverstone, R. (1994). *Television and everyday life*. New York, NY: Routledge.
- Silverstone, R., & Haddon, L. (1996). Design and the domestication of information and communication technologies: Technical change and everyday life. In R. Silverstone & R. Mansell (Eds.), *Communication by design: The politics of information and communication technologies* (pp. 44-74). Oxford, UK: Oxford University Press.
- Silverstone, R., Hirsch, E., & Morley, D. (1992). Information and communication technologies and the moral economy of the household. In R. Silverstone & E. Hirsch (Eds.), *Consuming technologies; media and information in domestic spaces*. London, UK: Routledge.
- Smith, M. R., & Marx, L. (1994). Introduction. In M. R. Smith & L. Marx (Eds.), *Does technology drive history? The dilemma of technological determinism* (pp. ix-xv). Cambridge, MA: MIT Press.
- Spires, H., Lee, J., Turner, K., & Johnson, J. (2008). Having our say: Middle grade student perspectives on school, technologies, and academic engagement. *Journal of Research on Technology in Education*, 40(4), 497.

- Stake, R. (2005). Qualitative case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE Handbook of Qualitative Research* (3rd ed., pp. 443 - 466). Thousand Oaks, CA: Sage Publications.
- The Royal Children's Hospital Melbourne. (2012). In their hands – iPads for learning trial. Melbourne, Australia: RCH. Retrieved July 16, 2012, from http://www.rch.org.au/education/research.cfm?doc_id=15265
- The Scottish Government. (2009). *Towards a professional development strategy for curriculum for excellence: Management board discussion paper*. London, UK: RR Donnelley. Retrieved from http://www.educationscotland.gov.uk/Images/ProfessionalDevStrategy_tcm4-565591.pdf
- TrinityCollege. (2011). iPads in the classroom. Retrieved May 26, 2012, from <http://www.trinity.unimelb.edu.au/about/flagship-programs/ipads-in-the-classroom.html>
- Warschauer, M. (2006). *Laptops in literacy: Learning in the wireless classroom*. New York: Teachers College Press.
- Williams, R., & Edge, D. (1996). The social shaping of technology. *Research Policy*, 25, 856-899.
- Yin, R. (1994). *Case study research. Design and methods* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Zucker, A. A., & Hug, S. T. (2007). A study of the 1:1 laptop program at the Denver School of Science & Technology. Denver, CO: Denver School of Science and Technology

APPENDICES

Appendix 1 – Initial Questionnaire

Appendix 2 – Interview Questions

Appendix 3 – Anne’s Interview Transcription

Appendix 4 – Participant Biographies

The Impact of iPads on the Daily Teaching Life of Middle School Teachers.
- Initial Survey -

This survey is designed to give me an insight into your initial thoughts about the iPad trial. It is not meant to be onerous task and should only take a few minutes, however the more information you can give me the better my understanding will be. Please feel free to respond in any format you are comfortable with. Once again, thanks for your participation.

1. Do you have any concerns about the introduction of iPads into your classroom?

2. What do you hope the use of iPads will help you achieve in your classroom?

3. Will the positives outweigh the negatives? How and/or why?

APPENDIX 2 – INTERVIEW QUESTIONS

How have you found the iPad experience so far?

How have you been using the iPad?

What were your initial thoughts when you heard about the trial?

Tell me about your personal use of the iPad.

Tell me about a standard activity you might do with the iPads.

What has surprised you about the iPad trial?

What needs to be done better?

What has gone wrong?

What frustrates you about the iPad trial?

What skills do the students need to develop?

How successful have you been implementing iPads into your classroom?

Have the iPads made it easier to do your job?

What iPad based professional development have you found effective?

What technology did you use with your classes before the iPad trial?

APPENDIX 3 – ANNE’S INTERVIEW TRANSCRIPT

- Craig: From my research, I’m looking at how the iPads impacted teachers. We talked about this before. A lot of the conversations we’ve had are really just for formalising. Thank you. I do appreciate it.
- Anne: It’s all right.
- Craig: Big picture stuff. How have you found the iPad experience so far?
- Anne: Okay. Fabulous. It’s been different for me because I took over the senior vice principal’s role. Which was the implementation of the iPad. I actually got an insight into it that helped me a lot as to see the big picture of how it’s been rolled out at our campus. I wouldn’t have had that situation where I was behind the scenes finding out what was happening there. The initial part of actually getting it to everyone was a part of what I dealt with, so that was good. Seeing the teachers here at our campus get them was exciting because I hadn’t had one before. Both my daughters have them and everyone was saying how good they were and to actually get one and have a chance to play with it and then to be given the PD to learn how to use it. It’s been a really positive experience I think.
- Craig: Cool. We are six months in now, almost and you’ve been using it for yourself and for your kids and stuff like that. How is it going compared to what you initially thought it was going to be like?
- Anne: I personally love it and find it far better than using my computer for the same sorts of things. My concerns initially were about how as an English teacher, how you would manage the printing. That’s been worked out. We are using less paper obviously because we are doing editing on the iPad itself with GoodReader and so on but I think what I’ve enjoyed most about it is everybody seems to have embraced it more than I thought. I found it so easy to use. That’s been beneficial. I think for me I find the incident *or* use of it has been something that I wasn’t expecting. I find I will say, ‘Look that up now. Let’s have a look here.’ I do it personally and in my classes and the easy access of the internet and the fact that everyone’s got one sitting at there desk has been really good. What was the question again?
- Craig: How does comp – initial thoughts. I suppose, what were your initial concerns?
- Anne: My initial concerns I guess there were a couple of them. From the subject point of view was the printing issue. In English we have so many essays and things that the girls print out and I was wondering how that would manage and at first I had them emailing me and I was printing them all, there final copies. Now we’ve managed that with a print it at home or they’re printed in library or I print it so there’s a balance of that. I think that parts fine. From a head of school, perspective I was concerned about the management of cyber bullying and things like that which we’ve obviously had to do with a number of things but I think we’ve been fairly lucky generally. I think we managed to get the message out that they

were school property and that at school there was appropriate uses of it and so getting through to the teachers, things like keeping the iPad shut if they are using them and monitoring that.

However having said that we've had a number of incidences were we've had students sending inappropriate photos of each other. We've had a situation where there were some photos that shouldn't have been on any of the Year 8 girls group, some inappropriate sending of messages. Those things were of concern because parents and staff thought that they might increase because of the use of an iPad but I don't believe they had increased because I think they were existing anyway and certainly Jason and I as the heads looking back we were still dealing with texting issues, computer issues. Most of the things that happened like that happened outside of school and then they come into school. I think that that kind of it.

The breakages has been a little bit of an issue, how we managed that. Certainly, in our girls school we had five breakages fairly quickly and they were all accidents and so the cost involved with that was an issue. People have been pretty good about it because they've got their iPads for free certainly suggesting that they are in padded bags and so on has been an advantage so that the kids now are aware that they can break. That was one of the things that I was worried about and I think we've got that message through about being careful with that. What else is there with the iPads that we worried about?

The concern that it might replace the normal procedure in classrooms with pen and paper and so on. I feel that it hasn't. The message very clearly was it was going to enhance our learning and that was the message we gave to the parents and I honestly believe that's what has happened. Again speaking from my perspective as an English teacher we have a balance of textbooks; we still read from the textbooks, we read from things that are on our iPad. We film work when I think I gave you an example of when we were doing a debate. I use YouTube to look up a sample of the debate to show the kids that someone else had done which was terrific. They then did their debate and filmed it and then they had their notes on their iPad. We definitely balance out the use of it but we use our English textbooks as well.

Craig: Cool. How do you use the iPad just you? Not with your kids.

Anne: The biggest thing I use it for is unexpected is to Google things. I used my phone. I find I've got to go out here tomorrow. I know I'm going to a lunch tomorrow for work and it's in the city, where's *the Rialto*? Okay, that's good I will look that up. Then the lunch happens to be with shadow minister for education. I then look up and find out a bit about him. I need to know about the Gonsky report; I'll look it up on the iPad. I'm using that all the time. I find it's a convenience in there. I use it certainly for my emails. I know use it for my notes, instead of taking notes at meetings. I went to a three-day conference a couple of weeks ago and I didn't take a notebook. I took my iPad which is a big step for

me and I took all my notes on my iPad and emailed them to myself and I've printed them out and they are filed in the book that I've got anyway.

Craig: What I like about that is with something like this you can record it and take notes in the same app.

Anne: Okay, that's good. For my uni. Study I actually used it to record my interviews like you are doing and photos. I take lots of photos. I like personal and photos for school but I guess I'm using it as my context I use it for that. I'm used it almost as my diary and my notes and things that I would normally use. The other night at our area meeting, when we were doing pastoral care I took all my notes on it and just file that away. Unexpectedly I'm using it more, iTunes.

Craig: And for me personally it's fairly unexpected things that I've enjoyed. I see what's going on.

Anne: Well you know me, I wasn't very IT savvy and I found it all too much of an effort and it wasn't natural whereas now the difference with having an iPad is I instinctively and naturally go to it. We have it sitting on the coffee table at home, and I'll pick it up and someone allows me to question. I'll go to it if I'm correcting work and I need to see the spelling of something. I go into there. I wouldn't go into a dictionary at the moment. I'd go into my iPad.

Craig: My wife and I sit there with our iPads playing Words with Friends on the couch.

Anne: Yeah, games, e-Bay. We've got big selling things on e-Bay. Well my husband actually has at the moment not me. Shopping, shopping online.

Craig: Without being harsh considering where you were with technology...

Anne: I know, it's true.

Craig: Three or four years ago.

Anne: Longer than that. Long ago. Really, last year, it's not my natural interest and so I found it. I've got to do it; I've got to do it. Whereas this has just become second nature to me. I think it's easy and it's quick and the more I'm using it, the more I can't imagine not using it. It becomes second nature and for me not to take a notebook to a conference is really dramatic because I trust that I can take my notes and then I can print them.

Craig: You are relying on it to work.

Anne: Yeah, I am, yeah.

Craig: You wouldn't rely on your laptop to work.

Anne: No, I wouldn't. I don't. Never has. I really do rely on and it's convenient, it fits in my handbag. That's the other thing. You carry around instead of carrying your big laptop. All the other things that they say, I just like it and I can't believe how often I do use it.

- Craig: Now with your kids, most teachers have got their standard go to activity that they pull out. Do you have a standard iPad activity that you use with your kids?
- Anne: Well I guess in again, in my subject of English we use the Flash Card app as part of our routine now that's the app that they put all their spelling words on. That becomes a quick revision, as part of our warm up, we use that. Is that what you mean or are you talking about...
- Craig: Yeah.
- Anne: ...another...
- Craig: Yeah, just the way I pictured in my head, back when I was basically out of uni. If I had a big night, what would I walk in.
- Anne: iPad.
- Craig: And say, okay I don't have a word program. What are we doing? I can be able to do this. It's just a standard...
- Anne: Well what I've done which is something that wouldn't have happened before is I've got lots of apps on my iPad that are English related apps. Mostly free, some that we bought and so I've got standard things there. A typical example is that with our revision, we handle our standard revision anyway but we went into Writing Professional, which was one of the apps, and there's all the parts of speech, there's all of the punctuation and then put that up and say to the girls, 'Here it is. This is for you.' Using the apps that have got really made things there. I mean with my computer I suppose I use the Smart Board less things that are there but I'm using the apps and things like that and then as I said the girls have their standard Flash Cards, which we do as a routine. That's all there.
- Craig: You talk about surprises a lot before. Have there been any major surprises along the way? What surprised over the last six months with the iPads?
- Anne: I'm constantly surprised at how easy things are to do and how much you can actually do with it. Initially I guess I didn't have a big enough understanding about what it was and I remember when my daughter and her boyfriend got one and I'm like but it's just like a big phone almost that doesn't ring and why would you have it? What else can you do with it? I think for me the whole experience has been a surprise in that it's easy to use and every time I talk to someone, I learn something more that I can do with it that's easy. Things like filming a lesson or taking a photo of your work on the board, those kinds of things. Kids, sending me their homework, one of the things is the accessibility I'm finding I'm able to handle things a lot faster because a girl had a question about a piece of homework that's in her exercise book. She photographs the page, sends it to me. 'Hi, Mrs. Gibbs, have I answered this correctly? Or I'm not sure about this. Can you help me?' and I can email a reply and

yet I don't have to see them. I'm not seeing them for two more days but she's got the instant reply. Thanks, school and that's it.

Craig: And you can be sitting home in your dressing gown, having coffee in front of the TV.

Anne: Yeah, yeah, or I could be here and I don't teach them until tomorrow because I'm not always up in the girls' school and so they'll send me an email and ask a question and it's done or I was away, what was the homework and you can send them their work. The surprise is just the easy accessibility and again you know the fact that I probably would have avoided filming anything because I think I've got to go the camera and load the video camera. Again, it's not my natural thing to do, whereas here, easy, you know. The girls even at the beginning in the year they were doing the *tent thing*. They wanted a photo. Here's a photo, I sent it to them straight away and they've got an instant. It's the accessibility that the constantly surprises and I'm sure I don't even know half the things I can do.

Craig: You are doing all though there.

Anne: I think I am and I was sort of forced into it by having to be part of it. I had to learn like everything when I was in the office with Derrick, I had to use it in all the meetings. Anything that was sent to me was there. I had to do presentations so I had to learn how to use Keynote because I presented him something on it. I was pushed into it pretty quickly because I had to be able to answer questions, had to do a presentation and marked it up. Remember at the iPad evening and I didn't know how to move around. It was the first time that I actually worked out how to move in and out. Now it's easy. Big learning curve but again it's just so easy and accessible. It's all the things that we say with the kids. It's portable, it's small, it's instant, it's exciting, it's colorful.

Craig: They are all the things I like to.

Anne: Yeah, I really like it.

Craig: Now, I suppose there's questions are all the bad stuff. I'll ask all three and answer them however, you want. I've got, what do we need to do better with them? What's gone wrong and what does your head in? What makes you want to hit the iPad and smash it against the wall?

Anne: Okay. What we need to do better? I think from the schools point of view we need to make sure that we are monitoring the issue of, call it cyber bullying, but the misuse of the iPad. Jason and I have been discussing, we think as a school because we are adopting them fulltime we need to make sure we are constantly informing the students about the dangers that can happen and not just us speaking to them but getting in. We have someone from the Federal police and someone who experiences that. So constantly providing them with the dangers of sending photos and giving away information and keeping them informed and also letting them know about the consequences of misusing them at school. That's probably coming from my view with my handling as the head of the girls'

school because it comes to my attention a lot. I think we have a responsibility to keep the parents and their children informed about those things as well. That's something that we would need to do better.

I think we've discussed the fact that once, I once they've bought them themselves it's their responsibility but I think we need to make sure that they are in something safe to carry. A recommendation would be a shoulder bag that's padded and then whether it becomes a Castle College one for everyone to manage that.

Just monitoring the proper use of it in class as well. I think the teachers are pretty good at that. I think personally what I need to do better is to source more uses for it, keep learning more of the potential for it so I can use it in my class better. I think that's it. What was the next question?

Craig: Has anything gone wrong?

Anne: No, I mean the breakages was a side effect of it. No, other than some misuse of it. Every time I've gone to use it, the dongles worked and it's there instantly. I haven't had any problems with using it but in class, at school and I honestly I've never felt – yes, I'll take that back. Have I felt like wanting to throw it against the wall? When I sent an email the other day that I didn't mean to. I couldn't retract it, retrieve it. Now I don't know if that's just me. I don't think you couldn't do it.

Craig: I hadn't, no.

Anne: Whereas people I asked said, well you can but you need to be on your PC to do it.

Craig: Even then I think it's a bit iffy whether they.....

Anne: It might say that you are trying. That's the only time I felt. Charging it, I guess we are managing it well. I'm sure about how that would go but the kids seem to have their charges, things charged. It hasn't been an issue, running out.

Craig: Most kids seem to have done fairly well.

Anne: Yeah, they get organised with it. I can't think of anything else.

Craig: Beautiful. What skills do the e kids need to develop? Is there anything glaringly obvious like have you had to spend heaps of your curriculum time teaching the iPad?

Anne: I haven't. I've discovered things myself and I'm certainly new to keep developing my skills, which are part of not having all the IT skills anyways. Some of it is just general IT skill but what I found is whenever I've managed to find something the girls are usually on to it or through IT here, I say, 'Have you used pages before?' 'Yes we have.' This is initially when we are setting up. 'Yes, we've been shown how to use a Keynote,' and I think the fact that they are being taught that in their IT classes is actually prevented me from having to worry about that and instinctively because they play with it. They are actually are teaching me

a lot of the things. I taught them Songify. I found that app how they can have their words made into songs. It's about playing and finding things there.

Craig: Turn your essay into a song. I love it.

Anne: Well the app is Songify and at the moment, they've only been able to do sentences and things. I don't know if you can do a whole one. It's something we are investigating but I think you can.

Craig: I've recorded my voice just being stupid.

Anne: Have you? Yeah, it's fun. Yeah. They had fun with that.

Craig: How successful do you think you have been implementing iPads into your classes?

Anne: I think I've been successful. I think I can confidently say it's been a much better experience than I thought and I've used it far more than I thought. I think the kids have embraced it because we knew that it was a trial and I think as far as in my curriculum I find as part of my planning I look for how the iPad can be used. Then I also find things incidentally. I've talked about, even when we are reading a book and then they ask me, where's that? We hop on and we look for the Google map and do a little virtual walk, come back, look up definitions and things but whenever I'm planning now and we've got our set planners, I'm looking at the iPad alternative to it or what could happen or how can I do that better?

Craig: For me I think that's what we need to do next. Incorporate suggested activities...

Anne: But there is a, you wouldn't have seen it yet. After going to this Understanding by Design PD that we went to, Craig has put out a planner and it's got an iPad column in it. That's where we are moving for next year. In fact, it's starting like we'll be writing it this term and next term. Next term, ready for 2013. That's been incorporated into it.

Craig: Have the iPads made it easy to do your job.

Anne: Yes, I think so. Again the instant availability of it. You can send things from anyway; you can access things from anywhere. I like the fact that I can walk in and plug in the dongle and instantly it's up. The kids get then on the internet straight away. I think the pace has improved because of it.

Craig: That's fairly common.

Anne: The level of interest and you can do things in a more fun way, you know. 'Let's have a look at this. Here's a great app that a comic,' comic sort of thing and so you go, 'That's really good.' I think it definitely has.

Craig: PD, PD comes in many forms, anything from talking to someone to those sessions where you got your iPad. What PD have you found has been effective for you?

Anne: The best for me is really one on one or small group. I really like sharing the ideas that our middles school means. We need to do that because I think that's fun and hearing from your peers and the things that work. Simple, short, sharp things.

Craig: I think we need to get that going again.

Anne: But the thing I find iPads have done, they've created a genuine interest in education with the teachers and so what we are finding is a lot of the incidental stuff sitting around the table at lunch, 'Look at this what I've just found.' 'Guess what I've just done. Have a look at this.' It's that collaborative sharing of things has been really good.

Craig: And that's really powerful stuff. Last question.

Anne: Okay. I really have to go.

Craig: Before you had iPads, how did you use technology with your kids?

Anne: Well, I did the best I could. I had the smart, used my computers. A lot of it was just word processing and presentations, PowerPoints and things like that but in the subject of English it was mainly typing of stories and things that are all using Smart Board lessons whereas now I find there's a whole lot more depth to it.

Craig: Thank you.

APPENDIX 4 – PARTICIPANT BIOGRAPHIES

Name: Charlie

Subjects taught: English, Humanities, Media Studies

Year levels taught: 5 and 8

Background: Charlie graduated from the University of Ballarat in 1998 completing a Bachelor of Education- Physical Education (Secondary) with a minor in Health, Outdoor Education and English. This combination of Physical Education and English was somewhat rare and, as part a small cohort, he was often designated courses with an Arts focus such as Hollywood Cinema, Victorian Literature and Fantasy to expand his English knowledge. In 1999, he started teaching PE three days a week at Rowellyn Park PS where I was given ongoing and full time by Semester Two. Prior to going full time at Rowellyn Park PS, he did some CRT work in the Mornington region. After three and half years of leading the PE program, Charlie was given the opportunity to take a Year 3/4 classroom role and relished that experience for the next couple of years. During his stay at Rowellyn Park PS, Charlie served as the OHS representative for staff, ran the District Interschool Sports association and was a member of School Council for two years.

In 2005 he began teaching at Castle College's Country campus, taking a Year 4 class for the first two years before moving into the Boys Middle School where he currently teaches. He has taught mostly English and Humanities during his time at Year 5 through to Year 9 level although he has taken Maths classes at both Year 4 and 5. He has served in a variety of roles including Middle School Curriculum Coordinator, 5/6 Curriculum Coordinator, Coordinator of Year 7 Boys, Middle School House Convenor, Staff Association Coordinator and Deputy Head of Boys Touch Rugby. Charlie has been fortunate enough to develop curriculum documents and assignments in a variety of subjects and serve on many committees. Over the last four years, he has developed and taught a Year 8 Elective of Media Studies which has aimed at studying varieties of Media and ultimately creating short films. In his teaching time, Charlie has been mentor to a number of new staff and taken the professional responsibility of mentoring Teacher Candidates/ Student Teachers who are developing their craft.

Name: Henry

Subjects taught: Science

Year levels taught: 7 and 8

Background: Henry joined Castle College in 1988 after completing a BEd in Secondary Mathematics/Science/Computer Studies. He has taught Maths, Science, ICT and Geography to Year 7 – 9 students at two campuses. Henry has been Head of both Science and ICT at campus level, Deputy Head of Campus, Deputy Head (Administration) and Acting Head of Campus.

He is passionate about teaching science and regularly integrates technology into his classes.

Name: Anne

Subjects taught: English

Year levels taught: 5 and 7

Background: Anne is a qualified Primary teacher who commenced teaching in 1980. Over her teaching career she has taught every age group from three-year-old Kinder to Year 9 in a range of Independent and government schools.

Anne was actively involved in the Middle Years Project and she held curriculum coordinator roles before moving into school leadership.

Anne came to Castle College as the Middle School Curriculum Coordinator as well as a classroom teacher. She then became the inaugural Head of Girls Middle School at the Country campus in 2002, a role she continued in whilst teaching English to the Middle School girls.

In recent years Anne has added the roles of English Coordinator for all three campuses, Australian Curriculum Implementation leader and Senior Deputy Head of Campus.

Anne was also asked to oversee the iPad Implementation Committee for a period of time when the Chair was on sick leave.

In 2013 Anne became the Head of Castle College's Southern campus.

Name: Mary

Subjects taught: Drama

Year levels taught: 5 – 8

Background: Mary is a qualified secondary teacher with qualifications in Drama and Dance and a Grad Dip in Outdoor Education. She has taught Outdoor Education in various schools Independent and government schools in Melbourne as well as running outdoor ed trips for a variety of schools. Mary has also taught drama and dance privately and within the catholic system. She joined Castle College as a Deputy Director of Performing Arts 5 years ago.

Mary is keen to use technology effectively in her classes but has experienced some difficulties with this in the past.

Name: William

Subjects taught: Music

Year levels taught: 4 – 9

Background: After completing a Music Performance degree at the Victorian College of the Arts, William combined his Jazz/commercial gigs and classical playing with the Australian Opera and Ballet with his day-job, instrumental teaching at a Melbourne independent School. William worked at MGS two days a week for seven years. On the other days, he taught in some great music programs at a range of independent schools around Melbourne. In 2003, William was invited to Castle College and he transitioned from being an instrumental teacher to the role of Classroom Music teacher for years 4-9 - a job he's been doing since 2006. As well as his performance and teaching

qualifications, William has a Master Certificate in Arranging & Orchestration from Berklee and is currently studying for a Master's in Music Technology.

Name: Liz

Subjects taught: English and Humanities

Year levels taught: 5 and 7

Background: After completing her Bachelor of Arts and Grad. Dip. in Contemporary Music Technology Liz taught private music classes while completing her Dip. Ed. She then taught classroom music at a secondary level for a few years. Liz spent a number of year juggling family commitments, private music classes and casual relief teaching while completing her Bachelor of Education. She joined Castle College in 2006 and has taught predominantly in the Middle School, focusing mainly on English and Humanities. She enjoys using technology with her classes and is passionate about finding new resources to use with her students.

