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One-to-one laptop program: Effect on boys' education

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One-to-one laptop program: Effect on boys' education

Steven Males

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DECLARATION

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

To the best of my knowledge and belief this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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ABSTRACT

Since the beginning of 1:1 laptop programs in schools there has been extensive research undertaken about the effectiveness of how laptops are used for teaching and learning. With an educational environment in Australia where the use of Information Communications Technology (ICT) is one of the five general capabilities of the Australian Curriculum, an expectation to use ICT effectively for teaching and learning is explicit. However, the use of laptops for teaching and learning is complex for teachers and students. Furthermore, parents are expected to support their child's learning in a digital age where mobile devices for learning are common. Therefore, investigating parental involvement and perceptions was a significant feature of the study.

This report presents a three-year longitudinal study that examined the implementation of a student-owned 1:1 laptop program in a school for boys in Perth, Western Australia. The research tracked 196 students drawn from the junior (primary) and middle (secondary) schools, their families and associated teachers for a three year period. The focus on male students is purposeful. Understanding how male students use their laptops for learning can provide useful insights into the affordances and risks for schools and, in particular, the field of boys' education. The aim of the research, therefore, was to describe and explain how boys use their laptops for learning in primary and middle school settings. Involving the whole school community in the research allowed for rich description and hopefully insightful explanation.

The research literature reports that the use of laptops for learning can increase motivation and engagement, improve technology proficiencies, provide enriched learning experiences, and help teaching and learning. The five research questions developed to guide the research were aimed at either endorsing or challenging these claims.

Underpinning this research was a mixed methods approach investigating how the boys used their laptops for learning, teachers' pedagogical uses of laptops, implementation differences between a junior and middle school, and the possible impact of the laptops on literacy and numeracy outcomes. A rich data set, collected over three years, and derived from qualitative and quantitative techniques, was interrogated in relation to the study's research questions. The study's longitudinal design provided further opportunities to triangulate data over the three years, enhancing the strength and reliability of the findings.

The novelty factor of laptops for learning quickly abated for both junior and middle school students. A two-pronged approach of providing targeted professional learning for staff coupled with confronting the obvious distraction that a 1:1 device can be for primary and middle school students, yielded positive outcomes. Students held strong views about the role, and effectiveness of a teacher when utilising their laptops for learning. Although teachers reported laptops were important for the teaching and learning program, there was a wide variation in the way teachers harnessed the 1:1 laptop environment for the benefit for student learning. Also, teachers were faced with pedagogical challenges in terms of considering games or Web 2.0 for learning. Literacy and numeracy outcomes based on national assessment results compared to national standards revealed the case study student participants performed favourably.

Four enablers for effective laptop use are theorised. These are: inquisitive students, creative teachers, proactive leaders, and national and state policy directions. However, five paradoxes potentially inhibited these enablers. These paradoxes are presented as 'spanners' in the cogs of effective 1:1 laptop initiatives: engagement and seduction of students; transformative and conservative pedagogical practices; integration and alienation of parents; autonomy and systemic dependency of schools; and, the hope and fear of Web 2.0.

The study may assist educational policy-makers, school leaders and teachers who are contemplating how to best integrate 1:1 laptop devices into the fabric of schools. A model is presented to provide new knowledge about the impacts of 1:1 devices on teaching and learning.

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GLOSSARY

ACARA

Australian Curriculum and Reporting Authority is an independent statuary authority responsible for national curriculum, assessment and reporting in Australia.

AITSL

Australian Institute for Teaching and School Leadership provides national leadership for the Australian, State and Territory Governments in promoting excellence in the profession of teaching and school leadership

DEEWR

Department of Education Employment and Workplace Relations (Australian Commonwealth Government), as of 18 September 2013 now the Department of Education and the Department of Employment.

DEST

The Department of Education, Science and Training was an Australian Commonwealth Government service between November 2001 and December 2007.

Digital Education Revolution

An Australian funding initiative that sought to contribute sustainable and meaningful change to teaching and learning in Australian schools and prepare students for further education, training and to live and work in a digital world (DEEWR, 2009)

Epistemological beliefs

Beliefs about the nature of knowledge.

eSafe

Integrated forensic detection (key-logging) and reporting of ICT service based in the United Kingdom.

Gaming

Another term used to describe digital games.

Government schools

Schools that are predominantly funded by government; also called public or state schools.

ICSEA

Index for Community Socio-Educational Advantage is a measure used to make comparisons across Australian schools.

ICT

Information and communications technologies refers to any technologies used for processing information and communicating. ICT can include computers, mobile devices such as laptops, phones and iPods electronic games and software (Selwyn, Potter, & Cranmer, 2010).

Junior School

An expression to describe a primary school where students range from Kindergarten to Year Six or from ages four to twelve. Primary schools in Australia are the main point of education before secondary school.

K-12

An expression describing the years of education between kindergarten and the final year (Year 12) of schooling in Australia.

Learning Federation

The Learning Federation (2001 to 2009) was a collaborative venture between Australia and New Zealand. It produced an extensive range of digital content, organised in subject areas for learning. The digital resources are now managed by Education Services Australia on behalf of all Education Ministers.

MCEETYA

Ministerial Council on Education, Employment, Training and Youth Affairs (Australian Commonwealth Government).

Middle School

For this study middle school is an expression used to describe the first three years of secondary schooling.

NAPLAN

National Assessment Program for Literacy and Numeracy. All students in Australian schools who are in Years Three, Five, Seven, and Nine take part in this standardised assessment at the same time across Australia annually.

NSSCF

National Secondary School Computer Fund which in 2008 provided $2.4 billion for the provision of ICT equipment for all students in Year Nine to Twelve in Australia up until 2013.

OECD

Organisation for Economic Cooperation and Development is an international economic organisation focused on improving economic and social well-being of people across the world.

One-to-one or 1:1

Abbreviation for one laptop or device per student for learning.

Organising elements (ICT capability learning continuum)

Adapted from the original statements of learning released by the Australian Commonwealth Government in 2006 the five interrelated elements are identified as applying social and ethical protocols and practices when using ICT, investigating with ICT, creating with ICT, communicating with ICT, and managing and operating with ICT (ACARA, 2010).

Parental controls

An Apple computer based feature enabling parents to set up a range of monitoring features and time bound limiters as the administrator of the device.

Pragmatism

A set of philosophical tools that can be used to address problems (Biesta, 2010, p. 97).

Private schools

Schools that are predominantly funded by private sources. In Australia, these include Catholic and independent schools.

Public schools

Schools that are predominantly funded by government; also called government or state schools.

Statements of learning for ICT

Statements released by the Australian Commonwealth Government in 2006 that make explicit to teachers, the types of uses for ICT in education. Five categories are identified: inquiring, creating, communicating, and operating with ICT as well as ethics, and issues associated with ICT (MCEETYA, 2006).

State schools

Schools that are predominantly funded by government; also called government or public schools.

Student engagement

Refers to the level of interest, curiosity and optimism students show when they are learning (Abbott, 2014).

Twenty-First Century learning (21st Century learning)

Twenty-first century learning or as known in this study as 21st Century learning, is an approach to learning with a focus on complex thinking, learning and communication skills, and more difficult to teach compared to rote skills (Saavedra & Opfer, 2012).

WACE

Western Australian Certificate of Education is the certificate given to students who have completed Year 11 and Year 12 of their secondary school in the state of Western Australia.

Web 2.0

A second generation of web-based communities and hosted services, including social networking sites (e.g., blogs, wikis, Facebook, Twitter), that assist interactive information sharing and collaboration through the Web, where users can interact and edit information, and are popular with young people (Lenhart & Madden, 2005).

CHAPTER 1. Introduction

1.1 Introduction to the Research

Use of Information and Communications Technology (ICT) within education continues to develop at a rapid rate, and the introduction of portable digital devices to support learning has led to an increased interest in this area. This chapter outlines the research and provides a setting for the study, together with its purpose and objectives. This chapter also highlights the importance of the study within the framework of recent research in the area of laptop integration into education, with a specific focus on boys' education. Finally, to conclude this chapter, there is a short synopsis of the structure of the thesis.

The 1:1 laptop program in this research is characterised by a school-supported, and student-owned, laptop for each student. With the potential for the same device to be used both at school and at home, a laptop opens up opportunities for student familiarity, and optimises device portability. Incorporating a laptop within a school educational program potentially opens up new avenues of teaching and possibly broadens learning experiences (Newhouse, 2014). Penuel (2006) identified three major characteristics of a 1:1 laptop program: (a) the provision of a laptop for each individual student imaged with a range of software and applications; (b) facilitating access to the Internet via a wireless network; and (c) a focus on using laptops for educationally related purposes.

One-to-one laptop programs began over 20 years ago in schools (Johnstone, 2003). Research has not been able to keep up with the exponential growth of 1:1 laptop initiatives (Warschauer, 2006), although considerable discussion of these programs has occurred. For example, Penuel (2006) located 30 implementation and outcome studies of 1:1 laptop programs with a specific focus on wireless connectivity to access the Internet in schools. These studies focused on the implementation of 1:1 initiatives and the associated potential impacts. Findings from the implementation studies provided some signposts for success. However, Bebell and O'Dwyer (2010) and Weston and Bain (2010) suggested that 1:1 laptop research has focussed mainly on the implementation process and whether or not “it works”, without sufficient evidence of the impact on the student experience, teacher effectiveness and parent involvement.

Some of the key critiques of research identified by the Organisation for Economic Co-operation and Development (OECD) Directorate for Education (Valiente, 2010) were:

- a lack of consistent evidence from monitoring and evaluations of 1:1 laptop initiatives;
- most of the evaluations are descriptive about the implementation without a measure of how devices are used in classrooms; and
- more knowledge between implementation characteristics and academic gains is required.

The OECD study is pertinent to this research, which has a particular emphasis on providing a deeper understanding of teaching and learning practices that emerge in the 1:1 laptop classroom. Laptop use can prove to be a powerful partner in the learning process, yet the success of the implementation depends upon the circumstances of individual schools and the implementation model and framework adopted by the teachers and the school (O'Donovan, 2009). With debate about the cost, the educational benefit, or impact, and effect of 1:1 laptop programs, the emergence of other 1:1 devices like iPads, the literature indicates an urgent requirement for further research into how to best harness 1:1 environments for the benefit of student learning (Borja, 2006; Jaillet, 2004; Lei & Zhao, 2008; O'Dwyer, Russell, Bebell, & Seeley, 2008; Schatter, 1999).

This research differentiates itself from past research in that its focus is on boys’ education and its design is longitudinal. Firstly, it focuses solely on boys, specifically looking at how boys utilise their personal laptops for learning in both a junior (primary) and middle (secondary) school setting. Boys’ education has received attention over the past decade, in particular in Australia where enquiries into issues associated with boys learning have led to better understandings about how boys’ learn differently from girls (Collins, Batten, Ainley, & Getty, 1996; Collins, Kenway, & McLeod, 2000; Hyde, 2005). Research such as the Boys’ Education Lighthouse Schools project (BELS) (DEEWR, 2007) which sought insight into how to better support boys in their learning has contributed to this literature. Furthermore, it was widely recognised that there are specific learning differences between males and females (McCoy, Heafner, Burdick, & Nagle, 2001; Merisuo-Storm, 2006; Watson & Kehler, 2012). Some prominent differences included a greater number of boys than girls identified as "at-risk" in literacy (Epstein, Mac an Ghaill, & Rowan, 2002; Rowe & Rowe, 2002); boys reporting fewer positive experiences and enjoyment of schooling (Trent & Slade, 2001); boys becoming disconnected in their schooling (McConaghy, 2006); and boys becoming easily distracted and less motivated if lessons are inappropriately designed (Collins et al., 1996; Gresham & Gibson-Langford, 2012).

This longitudinal research targets the following key areas in relation to educational outcomes:

- types of laptop uses for teaching and learning focussing on operational, inquiry, communication, creativity and ethical dimensions;
- how boys use laptops to embrace 21st Century learning opportunities;
- self regulation and reflective aspects to learning; and
- impact of effective leadership, planning and evaluation.

Secondly, a number of research studies (Cavanaugh, Dawson, & Ritzhaupt, 2011; Dunleavy & Heinecke, 2007; Silvernail & Gritter, 2005) focus on the effectiveness of laptop programs and explore the extent to which there is educational improvement. However, as Lei and Zhao (2008) indicate, there is a need for further longitudinal empirical research to identify the long-term impacts of 1:1 programs. Further, there is also a need to explore and develop assessment practices at the institutional level and beyond that evaluate student learning with digital technologies (Beetham & Sharpe, 2013; Bocconi, Kampylis, & Punie, 2013; Newhouse, 2013).

This research is presented as an in-depth longitudinal case study, which covers a three year time span and proposes a method of inquiry that searches for evidence of long term impacts on the student experience, teacher effectiveness and parent involvement. The research seeks to make an applied and theoretical contribution to the existing knowledge base, providing a new knowledge that is both analytical and explanatory.

1.2 Purpose of the Study

This research engaged and tracked 196 male students and their families and 52 teachers for a three year period as they progressed through a boys' school. It aimed to contribute new knowledge on how schools may consider implementing or refining an initiative such as a 1:1 program in relation to boys' education. This study used mixed methods (Tashakkori & Teddlie, 2010) to build new knowledge about the possible impact laptops have in the education of boys. Distinctly focused on the education of boys, the objectives of the research centred on:

- student use of laptops for learning;
- teachers' pedagogy and use of ICT for 21st century learning;
- implementation differences between a junior and middle school;
- capturing parental perceptions of the 1:1 laptop program; and
- possible outcomes on learning with an emphasis on literacy and numeracy.

In order to reach these objectives, five overarching research questions were structured to guide the study. Table 1.1 presents the research questions.

Table 1.1
Research Questions Guiding the Study

Research questions
1. How do boys utilise their personal laptops?
2. How are teachers engaging laptop technology for educational purposes?
3. What educational impact, if any, did the 1:1 laptop program have on literacy and numeracy outcomes?
4. What differences can be identified between junior and middle school implementation experiences in regard to research questions 1, 2 and 3?
5. What implications do the findings from research questions 1, 2, 3 and 4 have for the future inclusion of one to one laptop or mobile learning devices in schools?

The views of parents was seen to provide a more comprehensive narrative of the implementation, particularly adding value to research questions 1, 3 and 4.

1.3 Context of the Research

The School involved in this research had an enrolment of approximately of 1140 male students, enrolled in Year Four through to Year Twelve. There was a residential component attached to the School, which had some 204 boarding students. These students were predominantly from rural and regional settings with a small percentage (5%) of international students. The School had a total staff of 220, of whom 102 were teachers. This research focused on the student participants who were in Year Five (Junior School) and Year Seven (Middle School) at the inception of the research. Commencing in 2010, the School implemented a 1:1 laptop program. This program started with two year groups: Year Five (56 students: aged 10 to 11 years) and Year Seven (136 students: aged 12 to 13 years). Each student was required to purchase or lease an Apple MacBook laptop for use at the School each day. Students were required to take their laptop home each day and were allowed to use them for leisure and social purposes.

1.4 Background to the Study

The background to the study comprised the following: 1:1 laptop programs, features of the 1:1 implementation, policy background, the Australian Curriculum, boys' education, and how laptops are used for teaching and learning.

1.4.1 One-to-one laptop programs

Research based evidence available about the educational benefits of 1:1 laptop teaching and learning programs has continued to grow in recent years (Broussard, Hebert, Welch, & VanMetre, 2014; Penuel, 2006; Rosen & Beck-Hill, 2012). In reviewing the implementation of laptop programs in Canada, the United States and Australia, Alberta Education (2006) found that students from kindergarten to year 12 attained 21st century skills, improved writing, increased the quantity and quality of work, and increased motivation. There is no one single definition of what 21st century skills are; however, there is an understanding that 21st century skills focus on complex thinking, learning and communication skills, and are more difficult to teach compared to rote skills (Saavedra & Opfer, 2012). Other outcomes included improved attendance, increased teacher motivation, positive changes in teaching and learning environments, increased parental and community involvement and improved home-school communication. However, the study also found that there had been a lack of appropriate professional learning and technical support, sustainability, increased costs, lack of vision, leadership, planning and evaluation, as well as an increase in costs and sometimes competing educational priorities. The study concluded that successful 1:1 laptop programs tend to take a holistic approach by involving the whole school community.

Recent research about the introduction of 1:1 laptop programs recognises higher levels of engagement in learning (Bebell, 2005; Keengwe, Schnellert, & Mills, 2012; Won Hur & Oh, 2012); increased use of laptops for writing (Grimes & Warschauer, 2008; Penuel, 2006); the use of laptops for cooperative learning (Dunleavy, Dexter, & Heinecke, 2007; Fairman, 2004); and improved ICT integration for teachers (Cowie, Jones, & Harlow, 2011; Russell, Bebell, & Higgins, 2004; Rutledge, Duran, & Carroll-Miranda, 2007). However, there still appears to be mixed results in terms of academic achievement, with a call for more research into the impact of 1:1 laptops on teaching and learning (Lei & Zhao, 2008; Russell et al., 2004).

1.4.2 Features of the 1:1 implementation

There are a number of different questions or decisions that school leaders may address in choosing a 1:1 laptop implementation strategy. These all played a role in decision-making processes at the School:

- What is the educational value of having a 1:1 laptop program?
- Should the School target a specific year or year levels within a school or implement a program across all year levels?
- Should the program be School funded or parent funded?
- Is it a take home or leave the laptop at school program?
- What type of device and operating platform would best serve the needs of students?

The study tracked the implementation of a 1:1 initiative at one school. Prior to the implementation, the School gathered input from teachers and community members regarding how best to adopt a 1:1 laptop program. After this consultation, it was decided by the School that there were a range of reasons for implementing a 1:1 laptop program including that:

- it was thought that it provides a student-centred and rich educational experience for the 21st century;
- it was seen to actively engage boys in the learning process;
- it was perceived an effective and efficient way of supporting each boy's learning journey;
- it provides students with complete ownership of their learning device and control over their own learning environment;
- it connects education at the case study school with today's technological world; and
- it enhances accessibility to programs that increase the development of knowledge and educational opportunities.

The laptop implementation involved Year Five and Year Seven students simultaneously. The School believed that introducing the laptop program in both junior and middle school would provide opportunities to develop and improve the laptop program over time. Parents of the students at the School were also consulted about the 1:1 laptop program and the financial approach of funding such a program. It was decided a parent-funded, school-supported, take home 1:1 laptop program would best serve the needs of families and the students.

Choosing the technical platform was a significant decision for the School. After visiting nine schools across Australia, the Apple Macintosh platform was chosen as the device best suited for the needs of the students. A central factor of the decision was the inbuilt feature known as parental controls within the Apple Macintosh operating system, allowing parents the ability to access time limiting settings and analytics on features such as Web use. The School was concerned about the possible distractions or impact the 1:1 program may have on student learning or families. Therefore, the School believed the parental controls could help parents regulate the use of the laptop at home if required.

1.4.3 Policy background: Australia

Western Australia has a long history of 1:1 laptop implementation perspectives. In 1993 a private school in Perth, Presbyterian Ladies' College, was one of the first schools in Australia to implement a 1:1 laptop program, with children owning their own laptops. In 2003, the then State Minister for Education in Western Australia (Carpenter, 2003) made the decision to implement a State-funded laptop program in the public schooling system at John Willcock College in Geraldton (Newhouse, 2008b). The provision of one laptop per student and teacher played an important role in informing the case study School with information about the range of factors that should be considered when planning a move towards 1:1 laptop provision.

From a national perspective, in 2008 the Australian Government officially launched the Digital Education Revolution (DER) and allocated funding of $2.4 billion for the DER initiative. This funding was set aside for the National Secondary School Computer Fund (NSSCF). The fund provided for new or upgraded ICT, with the goal of providing a 1:1 computer to student ratio for all school students in Years Nine to Twelve. This funding clearly indicated the large scale economic support for digital learning technologies (DEEWR, 2009). With a change of government in 2013, funding of the DER came to a close leaving many school communities (public, private and independent) with mixed views about the effectiveness of the DER. Further, the incoming government was focused on other priorities in compulsory education, particularly in relation to a fair and equitable funding model. This shift resulted to some extent in a financial and policy vacuum for the ongoing support of 1:1 computer initiatives.

1.4.4 Australian Curriculum

Further to these changes to the digital landscape in education, Australian schools have also been in the middle of the introduction of a national curriculum. Since the onset of the Australian Curriculum (ACARA, 2013), ICT has remained at the forefront of one of the seven general capabilities for learning, which include literacy, numeracy, ICT, critical and creative thinking, personal and social capability, ethical understanding and intercultural understanding.

There are five key organising elements recognised for teaching and learning with ICT: applying social and ethical protocols and practices when using ICT, investigating with ICT, creating with ICT, communicating with ICT, and managing and operating ICT. These five interrelated elements were based on the Statements of Learning for ICT developed by the Australian Ministerial Council for Employment, Education and Training and Youth Affairs (ACARA, 2010a; MCEETYA, 2006). These organising elements provide Australian teachers and students an established framework on how to use ICT for teaching and learning. However, research reveals the types of uses for which laptops are used in classrooms can vary and result in debatable educational outcomes (Bate, 2010b; Goodwin, 2011; Larkin, 2012; Macnish & Trinidad, 2005; Weston & Bain, 2010). The current research can contribute to resolving this uncertainty by presenting an in-depth case study comprising of perceptions of students, parents and teachers along with observations and robust artifacts such the National Assessment Program for Literacy and Numeracy (NAPLAN).

1.4.5 Boys' education

Boys' education has attracted a good deal of attention in educational literature within schools across Australia and internationally (Bleach, 1998; Cresswell, Rowe, & Withers, 2002; DEST, 2006; Epstein, Elwood, Hey, & Maw, 1998). As recognised by Hodgetts (2008), the notion of underachievement is a prominent area of concern with girls consistently outperforming boys in standardised assessments in literacy, and boys more likely to have diagnosed learning difficulties. Continual improvement of education for students, and in particular for boys, depends on a tailor-made curriculum actively looking to engage and improve learning for boys. Differentiated learning for boys is vital, and recognising that boys have more than one learning style is crucial for catering for a wide range of abilities. As identified by Santangelo and Tomlinson (2012), teachers must teach in ways that demonstrate the differences in learners and maximising their capabilities. For example, this can be done by varying the difficulty of a task, determining the area of interest for the student or understanding the students' learning preferences (Algozzine & Anderson, 2007). Schaumburg (2001) claimed that boys have a natural affinity with computers and arguably a more confident approach than girls in using computers for learning.

Additionally, boys generally prefer mathematical, logical, spatial and hands-on approaches to learning (Butz, 2003). A 1:1 laptop program is one approach that can differentiate teaching and learning and respond to individual learning styles. Therefore, the research is concerned with finding out if a 1:1 laptop program promotes a greater depth of learning and if better outcomes emerge for boys, particularly in literacy and numeracy.

In 2005, the Australian Federal Government engaged James Cook University and the Curriculum Corporation to develop and trial a professional learning program for teachers working with boys in the compulsory years of schooling. Between 2006 and 2007 this program, called Success for Boys, provided schools with funding to take up professional learning in boys' education and incorporate it in their daily practice. The program focused on the following key intervention areas: effective literacy teaching; the use of ICT as a means of improving boys' engagement with active learning; giving boys mentoring opportunities from both within and beyond the school; and supporting Indigenous boys (DEST, 2006). In the final report by DEEWR (2008) titled "Evaluation of the Success for Boys Program" the findings revealed teachers identified ICT as a tool for improving engagement for boys, particularly those at risk within the classroom.

Computers continue to be used for learning, and can have a role in helping boys who experience difficulties with learning (Gurian, 2011). Lei and Zhao (2008) highlighted that re-engagement of such students can be achieved through the interactive nature of laptops and the availability of rapid feedback, which enables students to form new knowledge and enhance their understanding. Wilkes (2006) believed a laptop can be seen as a useful tool for literacy development for boys who may underachieve and struggle to learn. Some boys do not like writing and so it is possible that they might involve themselves in writing tasks with the multimedia capabilities of computers.

When considering the advantages and disadvantages of a 1:1 laptop program with reference to boys' education, important issues should be addressed to ascertain the impact on student learning outcomes. According to Prensky (2001) students are not in need of improved content, but of dynamic teaching approaches that promote greater understanding and 21st century learning skills. The use of ICT allows students to transfer skills in different contexts, promoting opportunities to reflect on their thinking, and practise addressing their misunderstandings, and collaborate with their peers (Saavedra & Opfer, 2012). Learning needs to be motivational and connected, and in order to learn, students require authenticity and relevance to what is taught. According to Hennessy and Murphy (1999) this authenticity and relevance, involves situations that are real for students, to their lives, and to situations they may face in their future workplaces. Therefore, separating lifestyles and learning for boys might be considered an ineffective practice. For example, research on children and digital games has shown boys are more likely to play digital games and simulations than girls (Aarsand, 2010). Therefore, it may be possible to leverage off this interest in digital games by presenting educational activities and content using a gaming metaphor or indeed games themselves.

Using ICT wherever possible, across all tasks, from information gathering to the publication of a boy's work, may be a valuable conduit for boys to engage in learning. Research by McCoy, Burdick and Nagle of male and female students' computer use and attitudes in a technology-rich environment (2001, p.5) revealed:

> Comparison of use category scores by gender found differences for males and females. When the data was analysed further the only difference was that males used their computer for games and music. Attitudes towards computers were positive, and were not different for males and females, but the males rated their computer expertise higher than females.

Using 1:1 laptops for games and music is risky as these activities may not be deemed as appropriate in the context of daily education, and possibly a distraction for learning. The manner in which laptops are managed for learning can depend on the views of teachers and parents, and also student attitudes towards learning (Erdogan et al., 2010). However, the researcher was interested in developing a deeper understanding of laptop use, and therefore knowledge on how to manage risks such as distraction may be invaluable.

1.4.6 Using laptops for teaching and learning

The implementation of 1:1 laptop education can have an impact on the teaching and learning dynamics in the classroom (Corkeron, 2000; Donovan & Green, 2010; Goodwin, 2011). The use of laptops is wide-ranging, as teachers have a great deal of freedom in terms of teaching and learning (Dunleavy et al., 2007;

Judson, 2006). There are indications that access to laptops, facilitates the implementation of inquiry based methods, as opposed to memorisation and practice, as well as more interdisciplinary approaches that value cooperative learning (Fairman, 2004). However, recent research has also highlighted various teacher concerns regarding laptop use for learning, or the distractions faced (Donovan, Hartley, & Strudler, 2007; Hatakka, Anderson, & Grönlund, 2013); the added value of such programs (Goodwin, 2011); difficulties in multi-tasking (Sana, Weston, & Cepeda, 2013); and the impacts on student achievement (Gulek & Demirtas, 2005). Examples of specific concerns are:

- the personal impact for teachers about how laptops are used for teaching and learning;
- how to meet the needs of the students when using laptops;
- the impacts of 1:1 laptops on educational attainment;
- the possible distractions faced when multi-tasking and learning; and
- the pressures of meeting content driven expectations within subjects in preparation for assessments.

In light of these concerns, a common challenge is helping teachers develop the expertise required to harness the power of 1:1 opportunities (Stanhope & Corn, 2014). This challenge goes beyond the lack of teachers' ICT skills and involves critical issues related to teachers' pedagogy and beliefs towards ICT use (Windschitl & Sahl, 2002). Being aware of one's pedagogical approach and beliefs towards ICT use then challenges teachers to thoughtfully guide student learning within digital environments, which are potentially richer and more complex than traditional print media, presenting high quality and challenging learning opportunities for both themselves and their students (Leu, Kinzer, Coiro, & Cammack, 2004). This research recognised the significance of communicating how laptops are used within a framework for teaching and learning and the potential for transformational ICT use by students and teachers.

1.5 Significance of the Study

The primary aim of this research was to investigate the implementation of a 1:1 laptop program and how this may affect the education of boys. Some of the factors believed to be important in the implementation of a laptop program were: student and teacher laptop use (Grimes & Warschauer, 2008); monitoring the educational impact on student achievement (Muir, Knezek, & Christensen, 2004); and student motivation and engagement (Russell et al., 2004). Other factors include identifying key differences or similarities in junior and middle school implementation experiences (Warschauer, 2005) and providing meaningful professional support for all staff involved in 1:1 programs, in order to maximise the potential of software for enhancing student learning (Owen, Farsali, Knezek, & Christensen, 2005). Clarification and consideration of these factors will inform educational literature, and provide a road map for schools wishing to implement 1:1 learning, particularly in boys' education.

This research aimed to fill a vacuum in the literature by specifically focusing on boys' education and how boys use laptops for learning. According to Bebell (2005), Roschelle (2003) and Hatakka et al. (2013), further research is needed to provide a deeper understanding of the learning processes with the implementation of a 1:1 laptop program and how laptops are optimised in teaching and learning environments. Bennet, Karl, and Kervin (2008) advocate teachers, administrators, policymakers and parents have every right to demand evidence and to expect that requests for change be based on well-founded and supported arguments. For a 1:1 program to have success in a school, a clear direction is required by all the participants involved to facilitate worthwhile change. Therefore, it is important for policy, research and leadership to cooperatively work together in ways to successfully implement ICT for learning in schools (Voogt, Knezek, Cox, Knezek, & ten Brummelhuis, 2013). With limited research and literature in the area of laptop use by boys, it is anticipated that this study will add to existing knowledge about 1:1 laptop programs and the effect on boys' education.

From a methodological standpoint, the research adopted a mixed methods approach (Tashakkori & Teddlie, 1998) and was guided by a pragmatic paradigm where areas of interest can be studied embracing methods that are appropriate. Qualitative and quantitative data are combined to construct a set of findings that are intended to give descriptive and measured understandings into the ways laptops are used for learning and the effects laptops have on learning for boys. This thesis collected evidence using mixed methods to enhance the explanatory potential of the research taking into account the broad and increasing amount of literature on 1:1 laptop and mobile device programs.

Through the dissemination of key findings from a case study school over a three year period, this research provides guidances for boys' schools or coeducational schools on a national or international level. It aimed to take account of, and where appropriate develop, the existing conceptual frameworks that have contributed to a deeper understanding of the complex relationships between learning and technology. These included:

- how ICT is used for teaching and learning (ACARA, 2010a; Bruce & Levin, 1997; MCEETYA, 2006);
- using learning attributes to evaluate the impact of ICT (Newhouse & Clarkson, 2008);
- effective methods of ICT integration for learning (Mishra & Koehler, 2006); and
- understanding the characteristic forms of teaching and learning in specific content areas - signature pedagogies (Shulman, 2005).

An explanation of these frameworks including how they are relevant to this study is provided in Chapter Two of the thesis.

1.6 Organisation of the Study

This thesis contains nine chapters. Chapter One has provided a context and background for the study and stated its purpose and significance. Chapter Two has two distinct areas of focus. Firstly, it presents a review of the literature of 1:1 laptop programs, teacher and student use of laptops, and the possible impacts of 1:1 laptop programs. Secondly, it provides a theoretical framework as a lens for understanding the study, from its methodology through to its interpretations and discussions of findings. Chapter Three provides an explanation of the research methodology engaged for this study. An explanatory framework is used involving consideration of both qualitative and quantitative data sources as part of the mixed methods approach. Chapters Four to Seven present the data and identify a number of key themes that have emerged from the study. Chapter Four details findings in relation to teachers' experiences. Chapter Five focuses on findings associated with boys' laptop use. Chapter Six presents the findings from parent perceptions. Then Chapter Seven highlights findings as they pertain to student performance in literacy and numeracy. Chapter Eight elaborates on the inferences made in the findings. Finally, Chapter Nine concludes this thesis and presents the limitations of the study and possibilities for further research and scholarship into 1:1 laptop implementations.

Chapter Two will now review the literature that has informed this study.

CHAPTER 2. Literature Review

2.1 Chapter Overview

This chapter provides a summary of the literature which informs the study. The main aim of this chapter is to position the research within an existing body of knowledge, and provide a background for the ensuing chapters of the thesis. The research is concerned with the way in which teachers and male students use laptops for educational purposes. In terms of possible impacts on learning and achievement, the study focused on specific literacy and numeracy outcomes over time. Furthermore, the research sought to build new information about learning with mobile devices, with a specific lens on boys' education. With an emphasis on junior and middle school experiences, factors such as the implementation differences between these two settings contribute to the possible opportunities for mobile learning in schools (Traxler & Vosloo, 2014).

Where possible, the literature review focuses on recent studies of 1:1 laptop initiatives in educational contexts. With a thesis focus on boys' education in junior (primary) and middle (secondary) school contexts, there are limited research studies that fit these criteria. Therefore, a broad range of literature with a specific significance for the study is reviewed (see Table 2.1).

Table 2.1
Focus of the Literature Review

Literature	Focus
Background of 1:1 laptop programs.	Context of 1:1 laptop research with a focus on junior and middle school implementations.
Possible impacts of 1:1 laptop programs.	Engagement and motivation towards learning. Literacy and numeracy results. Standardised testing and assessment. Digital gaming.
Teacher use of laptops.	How teachers use laptops or mobile devices for teaching and learning. Optimal use of ICT.
Student use of laptops.	How students use laptops or mobile devices for learning.
Parent perceptions.	The impact of 1:1 learning on families.
Framework evaluation for successful 1:1 implementation.	Measuring change. Signature pedagogies. 1:1 use of mobile devices as a tool to transform learning for the 21st century learner.

This chapter focuses on how teachers and students use laptops for teaching and learning. The literature review investigates the complexities attached to such programs such as the possible impacts of 1:1 laptop programs, parent perceptions, and frameworks that have been used to measure ICT use. With over 20 years of increasing evidence suggesting ubiquitous computing access through the use of portable digital devices for learning has been broadly successful (Newhouse, 2014), there still remains an interest in how 1:1 programs influence learning. Optimising the potential of 1:1 programs in schools involves understanding how teachers and students use laptops for teaching and learning, and creating some alignment of expectations between school, teachers, students and parents. Prior to discussing the literature as outlined in Table 2.1, it is worthwhile to reflect on why systems and schools consider 1:1 laptop programs so attractive.

2.2 Background of 1:1 Laptop Programs

Laptop programs have had a relatively long incubation period, beginning in 1989 in schools in the United States and Australia (Johnstone, 2003). There is a belief that in 1989 the Methodist Ladies College in Melbourne, Australia, provided the earliest example of a one device per student program in the world (Bebell, 2005). Since then, mobile devices have become more compact, powerful and affordable, enabling 1:1 programs to expand in schools across the globe (Cox, 2013). Empirical research into the effectiveness of 1:1 laptop initiatives is both timely and potentially valuable to those who are considering how to best harness the use of 1:1 laptops particularly with an ICT agenda embraced by governments and schools across the world.

With the proliferation of 1:1 mobile devices for learning, there still appears to be a lack of common agreement about what constitutes '1:1 computing' (Richardson et al., 2013, p. 5). In principle, the characteristics of 1:1 computing include 24-hour, seven-days-a-week access to an ICT device supported by the school, ultimately offering students ubiquitous access to ICT (Valiente, 2010). In this study, the 1:1 laptop program is characterised by a school-supported and student-owned laptop per student. Whilst some laptop programs provide school-owned laptops on a rotational basis, this research deals with student-owned laptops. It is proposed that the potential for learning might be greater when students use the same device at school and at home, as this enables greater familiarity and the ability for students to customise the device to their needs. Research suggests that incorporating laptops within an educational program can open up new avenues of teaching, potentially broadening students' learning experiences (Oliver & Corn, 2008; Weston & Bain, 2010). However, there are also legitimate concerns over the effectiveness of 1:1 laptop environments which, in many cases, are grounded in a generational struggle over what constitutes effective educational use (Lei & Zhao, 2008). Laptop education can be powerful on a number of levels including access to information, enhanced communication, and greater options for student creativity in terms of students accessing information on demand. However, the success of the implementation depends upon the circumstances of individual schools and the implementation model and framework adopted by the teachers and the school (O'Donovan, 2009).

Investigation into 1:1 programs is increasing and much of this research has been based on large-scale school laptop programs across the USA. The adoption of 1:1 initiatives has been widespread as was the case in the state of Maine, where the implementation of 1:1 programs began in 2001 (Bebell, 2005). In 2002, Henrico

County Public Schools in the State of Virginia embarked on what was the largest scale 1:1 initiative in the United States, providing over 25,000 laptops to teachers and students in years six through to twelve. Students, teachers and parents described the initiative as a positive addition to learning and teaching, with noticeable improvements in student-teacher and school-home interaction, and an increase in autonomous learning (Zucker & McGhee, 2005). Bebell and Kay (2010) report there have been few educational initiatives as widespread and as costly as the addition of computers for learning in American classrooms. Technology in learning environments has been used as an intellectual partner in the development of knowledge for learning through active participation in schools (Jonassen, 2008; Jonassen, Peck, & Willson, 1999). A report into large 1:1 school laptop programs, both state and district, in the United States, conducted by the Abell-Foundation (2008) came to the following conclusions: personal laptop use lead to gains; student engagement in learning increased; both students and teachers improved their ICT skills; and, the success of the program is dependant on an active educational community.

From an international perspective, governments across the world have continued to support the view that teachers need to be ICT literate in a digital world. As discussed in Chapter One, from a Western Australian perspective, in 1993 a private girls school in Perth, Western Australia, was one of the first schools to implement a 1:1 laptop program, with children owning their own laptops. The initial results of this implementation revealed devices were used sparingly and in general the results were not impressive (Newhouse & Rennie, 2001). However, after the 2003 decision by the Minister for Education (Carpenter, 2003) to implement a portable notebook program in the Western Australian public school system, Newhouse (2005) was able to build on his previous research about student access to portable devices. Newhouse’s new research consisted of a three-year evaluation of a student notebook program in a Western Australian secondary school. Results indicated widespread and consistent use of ICT by both students and teachers for learning and subsequently, Newhouse (2008b, p. 22) reported:

> The outcomes of this project when added to evidence from similar projects throughout Australia and in many locations internationally provide a basis to consider widespread implementation of notebooks in secondary education.

This view supported the establishment of the Digital Education Revolution (DER) in Australia in 2007, which allocated funding in 2008 for the National Secondary Schools Computer Fund. The aim of the DER was to contribute to meaningful change and prepare students for further education and training to live and work in a digital world. An outlay of $2.4 billion over six years (2008 to 2013) provided new ICT equipment for secondary schools with students in years nine to twelve. The underlying aim was to provide these students with access to a 1:1 device to further improve their learning through ICT (DEEWR, 2009).

Similarly, current rates of 1:1 initiatives continue to increase across Europe. For example, the European Schoolnet comprises a network of 30 European Ministries of Education where almost 20% of year four students are in 1:1 classes in Denmark, Ireland and Poland, with a European Union (EU) mean of eight per cent. In relation to year eight students, there are more students who are in 1:1 classes, with an EU average of 21 per cent (European-Schoolnet, 2013). This growth is noted in the literature (Biagi & Loi, 2013; Bocconi et al., 2013; Hatakka et al., 2013) which deals with educational experiences of the use of laptops or mobile devices for learning.

However, despite the continued implementation of 1:1 initiatives throughout schools, advocates and critics continue to discuss the use of laptops for teaching and learning (Bebell & O'Dwyer, 2010; Cuban, 2001; Peck & Sprenger, 2008). Nevertheless, research-based evidence about the educational benefits of 1:1 laptop teaching and learning programs has continued to grow (Donovan, Green, & Hartley, 2010; Hatakka et al., 2013; Lei & Zhao, 2008; Newhouse, 2008b; Penuel, 2006). How students learn with laptops has been a catalyst for previous and current research into whether or not 1:1 laptop programs have improved educational outcomes or academic achievement (Hunley et al., 2005; Romeo & Walker, 2002). Studies and evaluations, such as of the largest 1:1 laptop initiative in the United States, Maine's state-wide program (Goodwin, 2011) and more recently of a three-year study in a male-only middle school in South Korea, found little effect on student achievement (Won Hur & Oh, 2012). This does little to abate the apprehension of educators and policy makers wanting to invest in such programs where the focus on educational results remains a priority (Bebell & O'Dwyer, 2010).

One of the traits of a 1:1 laptop program is that students are capable of taking laptops to and from school with relative ease, incorporating the capacity for students to collaborate and work anytime, anywhere, commonly referred to as mobile learning (Kearney, Schuck, Burden, & Aubusson, 2012). An example of this approach was implemented between 1996 and 1999 by the Microsoft Corporation and Toshiba America Information Systems. These two IT corporations launched the 'Anywhere, Anytime Learning Program' across 29 schools across the United States. Students and teachers were provided with devices set-up with Microsoft Windows and Microsoft Office software, enabling exploration of how to best use these devices for teaching and learning. This approach was a precursor for other schools to consider 1:1 laptop programs, often found across the United States for the purpose of providing rich digital educational experiences for students (Rockman, Walker, & Chessler, 2000).

Schools introduce laptops for learning with a range of intentions. Stager (2006) outlined the following reasons why schools may choose to implement 1:1 laptop programs: (a) taking the lead in innovating and seeking to revolutionise their approach to learning, (b) using the implementation of laptop programs as a marketing approach to promoting the school, and (c) following other schools' lead despite not clearly understanding how a 1:1 laptop program fits into their educational program. Dawson, Cavanaugh, and Ritzhaupt (2008) shared a similar view and reported that the implementation of 1:1 programs can also be aimed at stimulating the educational program, force change within a school, change the school culture or add a new medium to an existing program. Additionally, in most cases 1:1 programs may be implemented for reasons such as providing greater access to technology and the Web, and making the introduction more of a technology-based approach without understanding the needs of staff or how they learn (Salomon & Perkins, 2005). In making these decisions school leadership plays an important role in formulating the rationale for implementing a particular 1:1 approach. Research by Newhouse (2012, p. 6) highlighted the critical importance of leadership in a school in the use of ICT, and the subsequent impact on teaching and learning:

> …the notion that successful integration of ICT in a school will require teachers having a sense of ownership of the vision and strategic plans and then being provided with adequate support for implementation. The principal and leadership team at a school needs to foster a vision, belief and commitment for ICT use across the school but then needs to involve a wider range of personnel in decision-making and policy-making.

In terms of school improvement, Zucker (2009) argued that a 1:1 laptop program in itself is unlikely to make a weak school into a strong one. Schools are required to focus on high-quality teaching, an effective curriculum, and an extensive and reasoned evaluation of 1:1 laptop programs (Penuel, 2006).

Adding to the 1:1 agenda, schools are faced with a rapidly changing world, and the role of ICT in current teaching and learning prompts consideration of change (Jordan, 2011). With a focused approach to learning, student and teacher collaboration and staff professional development on the use of laptops for learning can all be integral to enabling a successful implementation, therefore possibly improving meaningful student learning (Keengwe et al., 2012). With ownership of their own laptop, a 1:1 laptop program enables students to access a range of software or applications to complete learning tasks (Holmes, 2008), and the ability to access a range of digital online learning resources (e.g., Khan Academy, iTunesU, Mathletics).

Personal computing offers opportunities for many children to learn (Boyle, 2001). It is not about the laptop making the difference, but more so enabling new ways for teaching and learning (Dunleavy et al., 2007). In Australia, 1:1 laptop programs prior to the DER appeared in the early 1990’s in some Victorian public schools and John Willcock College in Geraldton, Western Australia, and also in private schools. This trend has increased due to the affordability of devices which has enabled schools to consider and implement 1:1 initiatives (Albion, 1999; NSWDET, 2009). Therefore, the role of school leadership becomes integral to guiding a school community in determining a path of 1:1 adoption that will ultimately lead to a fundamental shift of teaching and learning.

2.3 Possible Impacts of 1:1 Laptop Programs

There has been widespread research into the impact of ICT use on achievement (Bebell & Kay, 2010; Bebell & O'Dwyer, 2010; Lei & Zhao, 2007; Selwyn & Husen, 2010), mainly with the use of desktop computers at school that also applies to 1:1. Additionally, there may be other positive impacts due to the portable nature of mobile devices for learning (Newhouse, 2014). In most cases 1:1 initiatives are introduced by schools to assist students with their learning, with an overall aim of improved student achievement. The literature indicates that the most significant gains resulting from 1:1 laptop programs concern student improvement in written skills (Bebell & Kay, 2010; Gulek & Demirtas, 2005; Silvernail & Gritter, 2005). One of the main reasons for this gain is said to be students regularly using their laptops to write and edit their writing, with a transfer from primarily pen and paper experiences. Silvernail (2007) reported that five years after the implementation of the Maine 1:1 program writing scores in the Maine Educational Assessment (MEA) had improved. However, after four years of research into the effects of the Texas Assessment of Knowledge and Skills (TAKS), differences in writing scores were not statistically significant (Shapley et al., 2009). Since the introduction of the first statewide 1:1 initiative in the United States, the Maine and Technology Initiative (MLTI) in 2001, there has been little evidence to suggest that overall academic outcomes have changed significantly. Silvernail and Gritter (2005) found that the overall performance on the Eighth Grade Maine Education Assessments (MEA) had not changed since the inception of the MLTI.

Numerous large-scale studies (Bebell & Kay, 2010; Bebell & O'Dwyer, 2010; Dawson et al., 2008) have been undertaken to determine the impact of 1:1 programs on student outcomes on standardised tests, with little evidence to suggest any significant change. Goodwin (2011) noted that state assessment programs do not typically measure the 21st century technology skills (e.g., complex thinking, learning and communication skills) that 1:1 laptop programs promote. It is this predicament which continues to generate interest in how schools gauge whether such initiatives have an impact on learning or what is required to gain higher levels of achievement. A study of 997 schools across the United States by Greaves, Hayes, Wilson, and Gielniak (2010) identified key implementation factors linked to educational success. Examples of these key factors were: students using technology daily for online collaboration; integration of technology in core curriculum areas; the use of online formative assessments; and, gauging whether literacy or numeracy outcomes have changed over time. Furthermore, Weston and Bain (2010) maintained that 1:1 programs require an alignment with an improved pedagogical approach, with a focus on improved educational practices, to have an impact on learning outcomes. The extent to which these can be considered in terms of assessment was addressed in the next section.

2.3.1 Assessment: Literacy and numeracy

Since the onset of the technology penetration in schools in the United States, reading and mathematics test scores at the high school level are no higher than what they were 30 years ago (Grimes & Warschauer, 2008). According to Cuban (2006), there was no link between students having access to a 1:1 program and improved test scores. However, in contrast studies, such as that by Lei and Zhao (2007), links were found relating to the access of a 1:1 program and improved test scores.

Using standardised tests scores in isolation as a tool to measure the effectiveness of a 1:1 laptop program may prove to be a narrow approach. Aspects such as information literacy, problem solving, communication skills, and ICT capabilities are not well reflected in current standardised testing programs (Grimes & Warschauer, 2008). Although, standardised testing might be a crude instrument, it nevertheless plays an important role in measuring student improvement in key learning areas because of the associated reliability of the assessment (Perso, 2011; Suhr, Hernandez, Grimes, & Warschauer, 2010).

From an Australian perspective, national standardised testing was introduced in 2008 by way of the National Assessment Program for Literacy and Numeracy (NAPLAN), with an emphasis on writing, reading, spelling, grammar, punctuation and numeracy for students in years three, five, seven and nine. The testing under this program takes place each year at the same time across the nation. The data provides policy makers, school communities and parents with information concerning student performance and greater accountability in order to improve teaching and learning (Belcastro & Boon, 2012; Wildy & Clark, 2012).

NAPLAN is similar to the Maine Education Assessment (MEA) conducted in the US state of Maine where the use of laptops is common for learning. Middle school students are required to answer questions, predominantly multiple-choice, and do not test digital literacies. These digital literacies are commonly referred to as 21st century skills (Silverman, 2005), and discussed in further detail in section 2.4.3. Put simply, 1:1 laptop initiatives focus on a range of skills and capabilities that are difficult to measure with standardised testing methods. Holcomb's (2009, p. 54) highlighted skills that are "critical and inherent to a 1:1 initiative do not necessarily align with today's standardized assessments." Therefore, the use of standardised tests in isolation to monitor school improvement in schools with 1:1 laptop programs is problematic. High stakes testing agendas require schools to operate in environments where test scores are often tied to funding models. While standardised testing in OECD countries is commonplace, Morris (2011, p. 21) discussed some of its associated concerns:

> …the literature also reiterates that there are a number of limitations to standardized tests which weaken the capacity to achieve their purpose. Primarily, standardized tests are limited in scope both in terms of the breadth of their reach and in terms of their depth of assessment.

The literature suggests that evaluating 1:1 laptop programs with a sole focus on standardised testing results is limited and, researchers continue to search for accurate measures of student achievement in schools with 1:1 laptop programs. In terms of this study, there was no single instructional method advocated by teachers in implementing ICT on literacy and numeracy contexts. Therefore, there could be a range of factors that could impact upon literacy and numeracy outcomes.

In their examination of a technology-rich environment, O'Dwyer et al. (2008) argued that normal methods of assessment of student performance may not be effective when technology is used. Therefore, the possibility of using 1:1 laptop devices for assessment is another area of interest for the educational community. Research conducted by Hattie and Brown (2008, p. 198) into technology for school-based assessment of learning in New Zealand revealed that:

> Teachers are now asking for onscreen testing to save paper and data entry work, parents want access to the reports about their children, teachers want more flexibility in test creation, others have asked for computer adaptive testing so that less time is spent testing and more time is spent teaching.

Apprehension about eAssessment, commonly known as computer-based testing (CBT), and traditional paper and pencil testing is raised by Newhouse (2013) as computer-based testing models in schools are beginning to emerge, and are not common in high-stakes testing. The meta-analysis of testing mode effects on reading scores by Wang, Jiao, Young, Brooks, and Olsen (2008) revealed that grade level, type of test and computer delivery method had no impact on test scores. Opportunities for schools who have, or intend to introduce, 1:1 initiatives exist to invest time into using laptops as part of the assessment program.

The potential of CBT continues to gain attention in educational circles; however, as Redecker and Johannessen (2013, p. 90) noted, the role of policy is integral to a paradigm shift in the use and deployment of ICT in assessment.

> Policy plays an important role in mediating change that can enable a paradigm shift in eAssessment which is embedded in the complex field of ICT in education.

Such a policy shift could serve as a chance for schools and also policy makers to adopt meaningful CBT in education. Introducing CBT in a 1:1 laptop setting might be another strategy to engage students through the provision of faster forms of feedback. Improving the 'turnaround' of feedback by teachers could advance learning, as feedback is one of the most powerful influences on learning (Hattie, 2009).

2.3.2 Student engagement in learning

Abbott (2014, p. 1) defined student engagement, "as the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education." While there is mixed evidence for academic outcomes, the introduction of 1:1 initiatives has resulted in increased levels of engagement in learning (Bebell, 2005; Keengwe et al., 2012; Mouza, 2008; Shapley et al., 2009; Won Hur & Oh, 2012; Zucker & McGhee, 2005). Suhr et al. (2010) found this was the case in their research into laptops and fourth-grade literacy as it became apparent students enjoyed using laptops for learning. Similar findings were also reported by Bebell and Kay (2010) who uncovered high levels of engagement since the inception of the 1:1 laptop program in the Berkshire Wireless Learning Initiative. Improvements in engagement levels provide a powerful rationale for the introduction of 1:1 implementations. However, the novelty effect of computers may decrease over time, as suggested by Clark (1985), and ultimately the initially higher engagement levels may reduce.

With increased engagement in learning, laptops have also been responsible for a boost in student motivation (Dunleavy et al., 2007). Both learner engagement and motivation are important in a student's life and have been shown to have a positive effect on learning. This positive outcome has provided justification for schools to introduce 1:1 learning.

2.3.3 Concerns over student laptop use

One of the major concerns about laptop use is the potential for students to be distracted from learning (Malamud & Pop-Eleches, 2011). The opportunity for students to access and be distracted by inappropriate content, social media and online games in 1:1 environments becomes more prevalent and is concerning for parents and teachers. Hatakka et al. (2013, p. 106) reached the following conclusion about the distractive nature of an individualistic approach when using laptops for learning:

> …the decrease in teachers' ability to observe what is going on together with the more individualistic approach to learning have caused problems for students. Distractions from social media and computer games have been difficult to control and the students have had to handle the responsibilities on their own.

Another concern is the notion of the impact associated with excessive computer use when playing addictive online games or using social media, and the detrimental effect it may have on the physical and mental well-being of a student. On the other hand, this increased access to ICT may enhance the student's knowledge and skills in using ICT. The topic of digital gaming is discussed in the next section as it is of significance for this study, especially since there is an indication that boys are more likely to spend more time gaming than girls (Lenhart et al., 2008).

2.3.4 Digital gaming

Digital games have been around in one form or another for almost 50 years. However, recent advances in multimedia, coupled with improvements in the speed of the Internet and the emergence of competitive/cooperative experiences through multiplayer technologies, have resulted in an exponential growth of the popularity of games. Lenhart et al. (2008) reported that 97 per cent of teens in the United States play some type of digital game on a regular basis. A measure of the growing attractiveness of computer games for younger children in Australia can be found in the *Growing up in Australia* project, initiated in 2004 by the Australian Federal Government Department of Families, Housing, Community Services and Indigenous Affairs, the Australian Institute of Family Studies and the Australian Bureau of Statistics (DFHCSIA, 2008).

The *Growing up in Australia* project is a longitudinal study (2004-2018) that tracks two cohorts of families from around Australia on a biannual basis: an Infant Cohort comprising families with children 0-1 years as at 2004 (n=5,107), and a Child Cohort comprising families with children 4-5 years as at 2004 (n=4,983). In 2008, parents from the Child Cohort were asked whether their then 8-9 year olds (a) had a computer at home, and (b) played games on this computer. It was found that 90% of children had a computer and between 93% and 97% played computer games (DFHCSIA, 2013). Using data from the same study, Sweetser, Johnson, Ozdowska, and Wyeth (2012) found that the mean time using the computer/playing video games per week for children at age eight to nine was two hours and twenty-three minutes. The time steadily increased to two hours fifty-two minutes at age nine to ten (2009 data) and three hours thirteen minutes at age 10-11 (2010 data).

The playing of digital games has received a good deal of attention in recent scholarly literature (Erenli, 2013; Gee, 2012; Hess & Gunter, 2013b; Klopfer, Sheldon, Perry, & Chen, 2012). However, arriving at a suitable definition of digital gaming in education is tricky. At the one extreme, simple drill and practice questions or a roll of a simulated dice, activated by an individual using keystrokes, stimulating no feedback and completed in a matter of seconds, can embody the essential characteristics of a game. At the other extreme, multiple participants engaging in a range of sophisticated, multimedia-rich, immersive activities, involving complex and intelligent feedback over long periods of time might best describe an educational gaming experience. There are also subtle differences between digital games and simulations in terms of how they attempt to situate participants in virtual and real worlds (Sauvé, Renaud, Kaufman, & Marquis, 2007). This study views the construct of digital games in their broadest sense as far as the activity is concerned, but gauges the value of digital games in terms of the cognitive, affective or psycho-motor change (Anderson & Krathwohl, 2001) that emerges from engaging with the games.

There is disagreement across educational and health literatures on the appropriateness and impact of digital technologies on children's development (Mccarrick & Li, 2007). Gee (2005b) highlighted the potential of digital games as motivational learning machines with the capacity to engage learners in new and different ways. Others (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005) see exciting possibilities for digital games to increase participation in education and promote active citizenship. A number of recent empirical studies (Bai, Pan, Hirumi, & Kebritchi, 2012; Hess & Gunter, 2013b; Ke, 2008; Miller & Robertson, 2011) discerned significant learning gains through the use of digital games. Thomas and Seely Brown (2011) put a persuasive case for using digital games for people to better connect with each other and hone collaborative skills.

Finally, emergent studies in health sciences (Lieberman et al., 2011) see the potential for active play video gaming (exergaming) to improve the quality of life and social cohesion. Equally, though, there are good reasons reported why digital games have not been taken up in the classroom. Young et al. (2012) identified six reasons: inflexibility of the curriculum, negative effects of gaming, students' lack of readiness, lack of supporting materials, fixed class schedules and limited budgets. The perceived negative effects of gaming have been a particular focus in adolescent studies, and health and clinical psychology, much of which contends that gaming may have serious implications for child health, behaviour and emotional development (Brady & Matthews, 2006), social harmony (Sheese & Graziano, 2005) and academic performance (Chan & Rabinowitz, 2006).

Clearly the debate about the benefits and risks of gaming is far from over despite successive NMC Horizon reports (2012, 2013) giving game-based learning a two to three year time to adoption horizon. This study seeks to advance the debate by situating digital games in a tangible school context. As Selwyn (2011, p. 120) noted:

> Anyone seeking to gain a clear understanding of schools in the digital age must be able to focus their attention on the network of social relations that surrounds and envelopes the use of digital technologies in schools. Social constructions of school digital technology are...very different from the visions of technology use that tend to be promoted within much of the educational technology literature.

The "social relations" to which Selwyn refers can constitute relations between a wide variety of stakeholders including students, teachers, parents, school leaders and local/national policy makers. This study provides a snapshot of how gaming was defined and negotiated within one school setting over a three-year period between 2010 and 2012.

The contest of ideas about the benefits and risks of gaming is set in a tangible context where moment-by-moment decisions are made by students, teachers, parents and school managers, many of which impact on the academic and social development of the school students and the morale of the staff. These decisions are sometimes grounded in confused or even erroneous perceptions of what constitutes an educational experience within a digital game, how educational value is determined, and the pre-conditions required for expending the time and energy to embed digital games into the learning fabric of the classroom. Teachers are often encouraged to innovate with ICT, which includes using their discretion to determine whether a digital game has educational value. However, they are also expected to exercise a duty of care in ensuring that students are provided with a safe and secure online environment in which to engage in on-task, curriculum-related learning (Bate, Macnish, & Males, 2014; Selwyn, 2014).

2.4 Teacher Use of Laptops

Teachers have a significant role in teaching students essential skills to become digitally literate and competent in the 21st century (Fransson & Holmberg, 2012). According to Kereluik, Mishra, and Koehler (2011), teachers are challenged to scrutinise the use of technology for learning carefully, with a specific pedagogical value for the learner. There is a range of literature reporting positive impacts of 1:1 laptop programs particularly on teaching and learning (Bebell & O'Dwyer, 2010; Gulek & Demirtas, 2005; Zucker & McGhee, 2005).

One of the common obstacles to teacher use of ICT in the classroom is their own lack of knowledge about or expertise in using laptops for learning (Donovan, Green, & Hansen, 2011; Oliver, 2010). Teachers with experience in the use of laptops for learning are more likely to acquire new skills efficiently than those who have had minimal experience of laptops for learning (Cowie et al., 2011; Groff & Mouza, 2008). Since the introduction of 1:1 initiatives, laptops have been able to provide more flexible and accessible opportunities for teachers, providing them with access to a range of tools (e.g., software) and resources (e.g., online instruments) that are available at both school and home.

Without a well articulated and supported vision of technology integration by teachers, adding new technologies may have a minimal effect on changing teachers' pedagogy and their technology use with students (Clausen, Britten, & Ring, 2008). Newhouse's (2008b) research into how teachers in a regional Public (state) school in

Western Australia used 1:1 devices found that many teachers began to facilitate students' computer use by concentrating on learning outcomes involving research, investigation and the presentation of information. Similarly, Warschauer's (2008) two-year study of the use of 1:1 laptops related to literacy practices in kindergarten to year 10 (K-10) schools in California and Maine in the United States, established that when teachers used laptops for learning it provided a support for a mix of classroom topics, which promoted the construction of improved knowledge. Additionally, Warschauer noted an increase in student participation in a wide range of writing activities, analysis of reading and the use of media production software. Finally, Warschauer observed how students gained control of reading on the page as well as the screen.

An advocate of critical reflection about 1:1 laptop programs, Cuban (2003) stated that there had been a lot of unrealistic expectations placed on 1:1 laptop programs and was unequivocal in his view that the teacher is the central figure when using laptops for learning. Liang et al. (2005) research into design perspectives of 1:1 digital classrooms argued that for a 1:1 computing program to have an impact on learning, it must enhance three types of classroom activities: teacher directed instruction, small group learning and individual learning.

An increasing number of studies have shown that since the start of laptop education, teaching and learning dynamics have enabled greater flexibility for the integration of ICT use. Teachers have commonly reported using laptops to access vast amounts of information on demand via the Internet, direct students to inquiry-based learning, and facilitate learning with a shift from a 'sage on the stage' model to more of a 'guide on the side' approach (Corkeron, 2000; Mas Nida Md, Moses, & Luan, 2009; Rutledge et al., 2007). There are also suggestions that access to laptops facilitates new ways of teaching and learning as well as more interdisciplinary approaches that value cooperative learning (Dunleavy et al., 2007; Fairman, 2004). Providing a laptop to every child is achievable; however, the challenging task is helping teachers develop the expertise required to harness the power of technology (Albion, 1999) as often their beliefs can influence the extent of laptop use in classrooms (Ertmer, 2005; Fransson & Holmberg, 2012). As a result, the notion of constructivism has had a more noticeable impact on teachers since the arrival of 1:1 laptop initiatives (Rockman et al., 2000).

Constructivism is a theory of epistemology which posits that knowledge is generated through experience and is grounded in the learner's base of skills and knowledge (Piaget, 1952). Wilson and Cole (1991) and Jonassen, Davidson, Collins, Campbell, and Haag (1995) defined constructivist learning environments as ones that engage learners to work together in knowledge construction through collaborative activities. These environments embed learning in a meaningful context through reflection on what has been absorbed through discussion with other learners in pursuit of their learning goals. Studies of 1:1 implementations have found teachers using constructivist instructional practices with greater regularity since the introduction of laptops, notwithstanding the variability of laptop assimilation into their curriculum (Bebell, 2005; Silverman, 2005).

Windschitl and Sahl (2002) concluded that the challenge goes beyond the lack of teachers' technology skills and involves critical issues related to teachers' pedagogy and beliefs about technology. Teachers are now challenged to thoughtfully guide student learning within information environments that are richer and more complex than traditional print media, presenting high quality and challenging learning opportunities for both themselves and their students (Leu et al., 2004). The expectation for teachers to acquire knowledge and skills in 1:1 classrooms becomes amplified. Therefore, it can be difficult for teachers to keep pace with ICT and find personal time in a crowded school context to learn more about the possibilities of using laptops within their own classes (Unwin, 2007).

2.4.1 Teacher perceptions of students using laptops

Another factor linked to the use of ICT by teachers is their perceptions towards using ICT. Higher levels of confidence transfers to higher rates of ICT use for teaching (Ainley, Eveleigh, Freeman, & O'Malley, 2010). Interestingly, research by Pegler, Kollewyn, and Crichton (2010) into teachers' ICT use found there was no evidence that younger teachers are better users of ICT than older colleagues for school-related purposes. There is no evidence of a generational divide concerning teacher adoption of ICT.

Research by Falba, Grove, Anderson and Putney (2001) provided insights into how to minimise any fear of the laptop, teacher motivation and interest in technology, and how to develop technology skills and build teacher confidence. Teachers require quality professional development that is on-going, accountable and realistic in expectation, and is pedagogically productive in terms of teaching in the digital age (Kerans, 2007; O'Donovan, 2009). According to Jordan (2011), teachers need to improve their skillset to identify changes to their teaching and enhance their capacity to respond to learners' needs and increase learning outcomes.

Lowther, Ross and Morrison's (2001) research into the provision of laptops to fifth- and sixth-grade students in Tennessee in the Unites States showed that laptop classes were taught differently to classes without laptops. Nearly all the teachers taking part in the study believed that they were being impacted in ways that promoted active learning and technology applications because students had continual access to technology. Rizzo (2002) noted that positive changes in the learning environment brought about by technology are more evolutionary than revolutionary. As teachers use more technology in their classrooms to support their teaching, teachers and students can work as teams and engage in reflective, collegial patterns of work (Trinidad, 2005). Russell, Bebell and Higgins' (2004) research into technology use in fourth- and fifth-grade classrooms in Massachusetts in the United States also revealed that technology use by students and their teachers was higher in 1:1 classrooms compared with shared computer classrooms. However, Clausen et al. (2008) concluded that when factoring in the differences between observed instructional practices and infrastructure, a clear agenda and vision of technology integration was required if there was to be an effect on teaching practice.

The Laptops for Teacher Evaluation (Cowie et al., 2011), funded by the Ministry of Education in New Zealand to evaluate the impact of laptops on teachers, found that teachers used laptops for administration, communication, lesson preparation and planning, collaboration and classroom use. Bate, Macnish, and Males (2012a) in reporting initial findings pertaining to the current research, found teachers were positive about the use of laptops to improve learning in their classes. Additionally, teachers were implementing new ideas and experimenting with a range of applications and programs for learning. The research also suggested the need for specific strategies to highlight the potential use of laptops for learning through a visionary ICT agenda. This would involve the whole school community mainly in the benefits of on demand resources and the opportunities for students to use ICT creatively.

2.4.2 Optimal use of ICT for learning

With the adoption of 1:1 mobile devices into schools throughout the world becoming more standard, teachers are being called upon to use ICT effectively. Figures from European countries indicate that the take-up of 1:1 initiatives has continued to surge. A recent survey of schools analysing thirty-one 1:1 initiatives from 19 European countries involving 17.5 million students uncovered the need for pedagogy to incorporate 21st century learning, and to embrace more formative types of assessment taking account of ICT competencies (Wastiau et al., 2013).

In 1999 the then Federal Department of Education and Training, and, since 2013, known as the Federal Department of Education, conducted a survey on the technology skills of students, teachers and principals from all educational sectors across Australia. The study revealed that teachers' skill levels varied depending on the size of the school and the level of ICT support from the school or the system connected to the school. From a professional development standpoint, the report also showed that teachers were more likely to attend school-based professional development delivered in small groups over a shorter, condensed format. Approximately 15 years later, there are parallels to be drawn from more recent research. The continued development and adoption of required skillsets outlined by the Australian Curriculum Assessment and Reporting Authority (ACARA) (2013), Australian Institute for Teaching and School Leadership (AITSL) (2012) and the United Nations ICT Competency Framework for Teachers (UNESCO) (2011) identify the importance for teachers to continue their improvement as ICT educators, both nationally and internationally. Although, as outlined by Inan and Lowther (2010), a range of factors influence teacher acceptance of technology for learning; some of these are confidence, knowledge and the value of technology to support learning.

Positive views of technology use for learning are one of the main reasons why teachers use technology across all subject areas (Ertmer, 2005; Inan & Lowther, 2010; Miranda & Russell, 2011; Morris, 2010). With the diffusion of technology in classrooms well established in schools, the need for professional support becomes central for effective integration of technology. Pegrum, Oakley, and Faulkner (2013) in their research into mobile learning in schools emphasised four themes related to professional development for teachers: (a) bracketed time for professional development; (b) a focus on pedagogy ahead of technology professional development is essential; (c) targeted and contextualised professional development is most effective; and (d) building a professional community of practice/professional development network as a platform for professional development and encouraging collaboration.

Effective professional development programs recognise that the teachers' interests and needs must be considered (Stover, Kissel, Haag, & Shoniker, 2011). The conclusions reached so far are largely consistent with those reached by Ainley et al. (2010, p. 6) who suggested a range of factors associated with the pedagogical use of ICT:

> The use of ICT is greater when teachers have a higher level of or confidence with ICT, when teachers have participated in ICT-related professional development, and when there are fewer contextual obstacles (infrastructure, digital learning resources, ICT access).

Research by Cavanaugh et al. (2011) into 47 K-12 schools in 11 Florida school districts in the United States focused on how laptop computing changed teacher processes and found that teachers required access to exemplary teaching methods in 1:1 environments. This emphasis was seen to be an effective way of enhancing staff professional development to assist teacher understanding of effective technology 'infused' teaching and learning. Teachers who use ICT effectively consider content-specific knowledge together with pedagogical knowledge and technological knowledge, centring on the important issues of how ICT is put to use in classrooms (Judson, 2006; Mishra & Koehler, 2006). This ability to instil knowledge through content, pedagogy and technology is needed when considering how to use laptops for learning in the classroom and is sometimes overshadowed by other issues related to 1:1 implementations (e.g., network and connectivity problems, type of device, maintenance). The School that is the focus of this research had a dedicated ICT team to manage network connectivity, problems and overall functionalities of 1:1 devices.

Teachers who use laptops well embrace content-specific knowledge with pedagogical knowledge as seen in the Technological Pedagogical and Content Knowledge (TPACK) framework developed by Mishra and Koehler (2006). The framework continues to be used extensively (Agyei & Keengwe, 2014; Fransson & Holmberg, 2012; Kabakci Yurdakul & Coklar, 2014; Maeng, Mulvey, Smetana, & Bell, 2013; McGrath, Karabas, & Willis, 2011; Pamuk, 2012) to understand how teachers successfully integrate ICT in their teaching and highlights the importance of the role of the teacher. Teachers are required to have the necessary technological knowledge and skills to incorporate ICT in their teaching to develop students' ICT skills and learning experiences. Larkin and Finger's (2011) study of year seven classrooms in Australia implementing 1:1 laptop programs, revealed that teachers benefited from a 1:1 program where they had well developed technological knowledge. In an attempt to assist teachers, Harris, Mishra, and Koehler (2009) developed a taxonomy of activity types (content specific-driven pedagogical strategies with specific and compatible technologies) that targeted particular content areas for teachers. These activity types are similar to Shulman's (2005, p. 54) signature pedagogies:

> They implicitly define what counts as knowledge in a field and how things become known. They define how knowledge is analysed, criticized, accepted, or discarded. They define the functions of expertise in a field, the locus of authority, and the privileges of rank and standing.

Therefore, selecting, configuring and applying appropriate ICT approaches for the benefit of student learning is necessary. Teachers who are unable to identify the uses of ICT for learning are less likely to embrace the use of it for teaching. Subsequently, the variability between teacher 'take-up' of ICT use for learning can be wide-ranging, depending on teacher confidence and feelings of being prepared within their own subject matter experience (Roschelle & Pea, 2002; Van Acker, van Buuren, Kreijns, & Vermeulen, 2013).

In determining the impact or success of a 1:1 implementation, findings from past research reveals that teachers' attitudes and beliefs about the function of ICT within the curriculum can influence how computers are used for learning (Ertmer, 2005; Hennessy, Ruthven, & Brindley, 2005; Lam & Tong, 2012). However, embedded in schools is a mismatch of how contemporary teachers conceptualise ICT for learning and how they use ICT in learning. The role of the teacher is central to harnessing the potential of learning with laptops, subsequently determining the impact of technology use by both teachers and students (Bebell & O'Dwyer, 2010).

2.4.3 A 21st century balanced approach to learning

There is an abundance of educational literature about the features of 21st century learning (e.g., Griffin, McGaw, & Care, 2011; Kaufman, 2013; Larson & Miller, 2011; Lemley, Schumacher, & Vesey, 2014). The following key skills are often listed for preparing students for the future: information literacy, collaboration, communication, problem solving, creativity and innovation, and ethical use of ICT (ACARA, 2010a). Additionally, all of these skills can play a role in subject-specific contexts in 1:1 schools seeking to provide student-centred learning opportunities. According to Gunn and Hollingsworth (2013, p. 202), the shift in teaching and learning has become more evident with the introduction of computers in schools over the last three decades:

> The traditional methods of instructing students are no longer sufficient. Memorization, repetition, and basic comprehension are lower-order skills that were once useful but are now considered insufficient when compared to higher-order skills, such as critical and creative thinking, elaboration and evaluation.

While contemporary students in 1:1 initiatives engage in digital media on a daily basis, the importance for teachers to adjust to the 21st century educational environment has increased. Teachers are required to develop forms of ICT provision leading to opportunities to transform learning for students, where students are required to be good problem solvers and knowledge builders (Bereiter & Scardamalia, 2006). This approach presents challenges for teachers who may find it difficult to engage skills or features of ICT that are relevant and meaningful within the classroom. Research by Grunwald and Eduventures (2010, p. 5) into 21st century learning, which included 1,000 educators (783 teachers and 274 principals or assistants) in the United States found a common debate about technology and 21st century skills, demanding a balanced approach:

> The debates over technology and 21st century skills share common themes. Both revolve around the balance between the traditional and the new, between research based and emerging practices, between playing it safe and choosing to try different approaches. Both debates center on results: Does integrating technology or 21st century skills (or both) distract from or enhance critical educational outcomes?

Research by Larkin and Finger (2011) into 1:1 computing in Australian schools reported that primary school teachers were using laptops for learning about 40% of the available time in their classrooms. Selwyn, Potter, and Cranmer (2009, p. 928) reported that ICT use by primary school students in Britain was often "perfunctory and unspectacular" within the school setting. Therefore, to optimise the use of ICT and benefit student learning, schools are required to rethink the pedagogy critically. This entails ensuring ICT use encapsulates the learning requirements of the 21st century digital age (Beetham & Sharpe, 2013), yet still preserves a balance between traditional and new approaches to teaching and learning.

2.4.4 Differentiation for teaching and learning

Differentiation of instruction is not new; however, it continues to be discussed in schools where, for example, the number of students who are not achieving the highest level of literacy is still an issue (Watts-Taffe et al., 2013). Ultimately the aim of a differentiated classroom is for all students to be engaged in instruction and participating in their own learning (Morgan, 2014). The potential for laptops or mobile devices to be used as a tool for differentiated learning opens up a range of approaches for teachers through a technology-assisted pedagogy. A focus on communication, inquiry and collaboration in the development of meaningful teaching and learning settings are considered to be significant (Dreher, 2012). Students in a 1:1 classroom do not have to rely solely on a teacher for instruction, with increased access to the Internet enabling access to online resources or applications. This approach provides opportunities for differentiation to occur by engaging students in work that may be more autonomous rather than relying completely on teacher instruction (Owen et al., 2005).

2.4.5 Managing distractions and online safety

Managing distractions in 1:1 environments is particularly challenging for teachers (Bate et al., 2012a; Corkeron, 2000; Dunleavy et al., 2007). The ability of students to multitask and the temptation to play games and use social media have emerged as themes in classrooms using mobile devices to support learning (Waterston, 2011). Both play a part in the distracting characteristics of laptop instruction in classrooms where classroom management problems may arise (Owen et al., 2005). The potential lure and excitement of laptop software and the Internet may expose students to the distractions associated with using technology initially. However, over time it appears the attraction of the device diminishes, as shown in the longitudinal study conducted by Lei (2010), where levels of distraction and off-task activity were reduced to more acceptable levels in the second year of the study.

With the provision of greater access to the Internet for students, schools are often required to consider their obligation in terms of providing a safe network for their users. For example, the use of Facebook and Twitter have been linked to increasing instances of cyber-bullying. Network safety and the policing of inappropriate behaviour on school and student-owned ICT is a topic of contention, particularly in negotiating boundaries and responsibilities between home and school (Erdogan et al., 2010; Riva, 2011). However, given that even children from primary schools are now provided with powerful Internet-ready devices in order to research and collaborate with others, negotiating boundaries and responsibilities is both timely and crucial. The School at the centre of the research had an acceptable use policy for laptops and mobile phones. As with the Australian curriculum, the majority of European schools view online safety as part of the curriculum as a priority in both primary and secondary schools, as seen in a summary report of education on online safety in schools in Europe (Ranguelov, 2010).

There is a growing trend towards students' use of the Internet to gain greater meaning from what they learn in the classroom (Katyal, 2010). Effective teaching and learning includes establishing routines and procedures for classroom management (Hart, 2010) whether this is in teacher- or student-centred settings. In an ICT-rich environment, the potential for off-task behaviour might be magnified by the availability of the device. Schools are now challenged to provide a safe and secure network, and constantly monitor how networks are being used. Whilst there is an abundance of information and products available to help parents provide a safe ICT environment at home (Hinduja & Patchin, 2010; Liau, Khoo, & Ang, 2008; Lin, Lin, & Wu, 2009), school systems, school districts and schools tend to have more eclectic approaches to student safety and security.

Anastasiades and Vitalaki (2011) and DeFranco (2011), suggested that there are few evaluative studies focusing on teachers' involvement in Internet safety and acceptable ICT use both in and outside of the classroom. Clear guidelines, policies and consequences are important in ensuring that the expectations of school leaders, teachers, students and parents are consistent. However, there is a dissonance, identified by Prensky (2005) between how Generation Z (people born after the millennial generation – post the year 2000) students perceive ICT and the more traditional conceptions held by older school leaders, teachers and parents. Hsu (2010) suggested that there is an urgent need to support the generation of school leaders, parents and teachers who are caught in the digital divide and trying to learn on the run.

Findings from research by Gibb, Fergusson, and Horwood (2008) into gender differences in the educational achievements of individuals under the age of 25 suggest that male achievement could be raised by improving classroom behaviour. There is limited literature setting out specific strategies for improving boys' use of ICT in 1:1 classrooms, and this may well be an area for further research as schools are often seeking approaches or solutions to enhance teaching and learning. The next section of the literature review examines how both junior and middle school students use laptops through a discussion of (a) specific laptop uses by students and (b) the implications of these developments for boys' education.

2.5 Student Laptop Use: Junior and Middle School Experiences

Grimes and Warschauer's (2008) research into laptop use in a cross-section from kindergarten to year eight found that laptops were used daily for language, arts, science and social studies, though less frequently for mathematics. One of the main points about the introduction of 1:1 laptop programs is for students to be able to use laptops for learning, collaborate and work anytime, anywhere (Stager, 2006). Subsequently, Lei (2012) categorised laptop use into four distinct areas for students, applying a similar ICT use framework as developed by Bruce and Levin (1997). Table 2.2 provides examples of these laptop uses.

Table 2.2
Lei's (2012) Four Categorised Laptop Use Areas

ICT Use	Examples of Laptop Use
Learning	Taking notes using software such as Pages, Microsoft Word, searching the Internet, learning specific subject content, online discussion;
Communication	Communication with teachers via email, communication with friends using email, Facebook, Skype, instant messaging or other social-networking websites or Web 2.0 tools.
Expression and construction	Designing web sites, writing.
Entertainment	Playing online games, role-playing in a posting forum.

Similarly, the New South Wales Department of Education review of 1:1 computing programs (NSWDET, 2009) showed writing and research were the most common uses of laptops by students. Research by Suhr et al. (2010) into fourth grade students who were using laptops for literacy lessons revealed that they used Notebooks in their classes to conduct Internet searches for research, used a word processing package to create written documents, created presentations using a suite of software, and completed tests or online quizzes set by teachers.

With increased Internet access, student use of laptops for communication and research has continued to rise in schools adopting 1:1 laptop programs (Bebell & Kay, 2010; Lei & Zhao, 2008; Suhr et al., 2010). Students can contact teachers through email, and communicate about tests, assignments or school related matters. However, when students interact amongst themselves, social media platforms such as Facebook are regularly used. This method of communication appears to be widely embraced by students; however, school leaders are reluctant to use and communicate with students via social media as some believe they are passing trends or do not have the time or energy to invest in them (Porterfield & Carnes, 2012). The reluctance by teachers to use Web 2.0 tools (e.g. instant messaging, blogs, YouTube, Edmodo, WordPress, Prezi, Twitter) to assist students to deepen their learning to another level is due to a range of reasons as Luckin et al. (2009, p. 102) explained:

> … schools often offer teachers limited scope to incorporate them, with other requirements taking precedence, such as e-safety, privacy, hierarchical organisation

> and infrastructure, set bodies of knowledge, assessment, and a long standing pedagogical tradition that favours the individual over the group, the text over the modalities, and the enclosed environment over the open. This puts teachers in a difficult position.

According to Dowell, Burgess, and Cavanaugh (2009) and Johnson (2010), common uses of the Internet by young adolescents and young children were for social interaction, sharing of ideas, creating, photography, blogging, online gaming and for school work. These common Internet uses and types of access by students can also have a range of concerns or risks attached to these online behaviours. The following list by Lazarinis (2010) provides examples of some of the online risks students may face if given unrestricted, unsupervised access to the Internet: adult content, paedophilia and sexual harassment, cyberbullying, offensive language and online gaming. Other studies (Livingstone, Haddon, Görzig, & Ólafsson, 2012; Thornburgh & Lin, 2002) have also reported that students who spend time on the Internet are exposed to sexual and violent content, including the danger of unsafe meetings with unknown persons.

From a boy's perspective, gaming and online video content are fascinating (Simons, de Vet, Brug, Seidell, & Chinapaw, 2014). Accessibility of pornographic content is wide-spread and research by Wallmyr and Welin (2006) into young people's attitudes towards pornography found that the 15-year-old male group had the highest rate of access to pornography. With increased levels of ICT use, the capacity for students to encounter situations where inappropriate content is readily available increases. The literature therefore stresses the importance for schools to develop age-specific approaches in terms of Internet safety when using laptops for learning, and the importance of parents educating and monitoring Internet use at home.

In developing age-specific approaches, teachers are placed in a challenging situation as to if and how to use Web 2.0 tools to inspire or transform ICT use for students. According to Fewkes and McCabe (2012, p. 97), secondary school students in Canada using Facebook for learning found that, "giving students a little more freedom and trust in a less controlled environment may be the key." However, Selwyn, Boraschi, and Özkula (2009) argued that teachers needed to be cautious of introducing popular digital practices into classrooms in the hope of transforming technology practices within formal education. Instead, Selwyn, Boraschi, and Özkula suggested placing a greater emphasis of dialogue with students about the possible educational benefits of using ICT at school.

Educational literature on 1:1 laptop use by students reports increased use of software tools for creative purposes (e.g. documents, assignments, webpages, multimedia, timelines) (Bebell & Kay, 2010; Lei & Zhao, 2008; Mouza, 2008). Laptops have the potential to entice students to write as Mouza (2008) reported, with students in 1:1 classes preferring to write with laptops using word processing software. Therefore, it is quite possible that with increased access to computers, as is the case in 1:1 programs, student motivation for writing has the potential to increase. More recently research by Biagi and Loi (2013), based on the Programme for International Student Assessment (PISA) 2009 results, confirms that there were four different groups of ICT activities captured by 15-year old students at home and school. The four groups included: gaming activities, collaboration and communication activities, information management and technical operations, and the creation of content and knowledge and problem solving activities.

How students use laptops or mobile devices varies depending on the setting, time of day and specific reason, such as for school-related work or personal use. Correspondingly, teachers and parents have varying perceptions of how students should be using 1:1 devices for learning (Bate, Macnish, & Males, 2012b). Reasons for schools implementing 1:1 initiatives, as discussed above, can range from broadening the learning experience, adjusting to the 21st century environment or improving overall access to ICT. With this understanding, schools are encouraged to adopt ICT-rich approaches. How the chosen device may assist students to learn within a classroom and school context becomes important in terms of a school-ICT strategic understanding of its vision (long term goals) and its mission (aims). Schools often adopt correct use policies, guidelines and frameworks emphasising that the chosen device is a powerful learning tool that should be used accordingly (Bonifaz & Zucker, 2004). For example, schools may stipulate the following: no access to social media, games, inappropriate web content or pirated music or video. Contravention of these guidelines, usually, leads to some form of sanction. However, students still find staying on task difficult, depending on the lesson, as the temptation to use social media or play games is often too enticing.

Research by Hatakka et al. (2013) into student laptop use in Swedish schools revealed that when students were provided more choice about how to use their laptops, some students found it difficult to stay on task. In terms of self-regulation, students who were high-achieving and motivated towards learning were less likely to be distracted by the temptations (e.g., accessing social media sites, gaming) on offer when using a laptop.

These age patterns could help inform schools to determine a year level entry for introducing a device. Considering when, in terms of a school year level, it is appropriate for a student to have access to a 1:1 device is an issue on which researchers have been largely silent, despite this potentially being of significant assistance to educators. In pinpointing these differences, the next section will address boys' education.

2.5.1 Boys' education

Boys' education has been a significant focus within schools across Australia, in particular the relative underachievement of boys over the last 20 years (Hodgetts, 2008). Boys' underachievement is not a new occurrence (Cohen, 1988; Epstein et al., 1998) and internationally, recent literature about the gender differences in primary and secondary education continues to uncover consistent findings about boys underachieving (Voyer & Voyer, 2014). In the Netherlands, research by Driessen and van Langen (2013) discovered minimal differences in effect size in the subject areas of Mathematics or English. However, the position of boys' educational level and behaviour was much more unfavourable than that of girls. In the case of the United Kingdom, a lower percentage of boys were meeting appropriate age achievement scores administered nationally, and girls' written skills were at higher levels than those of boys (Bourke & Adams, 2011). In Canada, girls continue to outperform boys on high stakes literacy tests, national assessment programs and the Program for International Student Assessment (PISA) (Watson & Kehler, 2012).

Differentiating for boys is critical as the learning needs are wide-ranging, and most boys are visual learners (Wilkes, 2006). It seems that boys have a natural affinity with computers and thus can be viewed as having a more confident approach to using computers than girls (Schaumburg, 2001). In 2005, the Australian Federal

Government engaged James Cook University and the Curriculum Corporation to develop and trial professional learning materials for teachers working with boys in the compulsory years of schooling called the Success for Boys Professional Learning Program (DEST, 2006). Between 2006 to 2007, Success for Boys Professional Learning Program provided schools with funding to take up professional learning in boys' education and incorporate it in their daily practice. The Success for Boys Professional Learning Program focussed on effective literacy teaching and the use of ICT as a means of improving boys' engagement with active learning as the key intervention areas of particular benefit to boys. Computers, therefore, continue to play a significant part in learning, and can be integral to helping boys who experience learning difficulties (Lei & Zhao, 2008).

Lei and Zhao (2008) highlighted that re-engagement in learning can be achieved through the interactive nature of laptops, and the availability of rapid feedback that enables students to form new knowledge and enhance their understanding. A laptop can be seen as a useful tool for literacy development for boys who may underachieve and struggle to learn. Some boys do not like writing, but they are more likely to involve themselves in such a task if computers are involved (Sokal & Katz, 2008; Wilkes, 2006). Additionally, as digital technology has become more visible in the lives of students across the world, using mobile technology to motivate and engage boys in literacy learning has become another approach used by teachers (Brosseuk, 2014).

Learning needs to be motivational and connected. Separating lifestyle and learning might be fraught with danger, as most children enjoy games and simulations which inadvertently seem to capture more boys than girls (Prensky, 2001). Using ICT where possible across all tasks, from information gathering to the publication of boys' work, is seen as a valuable conduit for boys to engage in learning. Whitely (1997) conducted a meta-analysis of 82 studies that revealed boys had more positive attitudes towards computers than girls. Additionally, it is acknowledged that girls are generally better listeners than boys, and hear more of what is said in conversation, while boys tend to hear less and often ask for clear evidence to support claims, or use methods to support their understanding (Gurian, 2011). The use of laptops by boys is an area of relevance to see if such a tool can support or enhance boys' ability to organise their thoughts and assist their learning.

Rowe and Rowe (2002) proposed a range of strategies for supporting the learning needs of boys after their inquiry into boys' education in Australia. Some examples of these were: a clear focus on supporting literacy; differentiated curriculum that is highly structured; less group work and more teacher directed work; and, methods for assessing underachievement. These strategies are also supported by MacDonald, Saunders, and Benfield (1999) who conducted research into boys' achievement, progress, motivation and participation in the United Kingdom. Additionally, boys' learning is directly affected by: family influence outside of the school environment; school environment and culture; peer groups; and gender concepts on attitudes and behaviour (Lingard, Martino, Mills, & Bahr, 2002). Building partnerships across the school community could be viewed as an important feature for enhancing learning for boys.

2.5.2 Characteristics of effective teachers

The report *Quality matters - revitalising teaching: Critical times, critical choices*, written for teachers by Ramsay (2000), stated that, according to the students, they wanted their teachers to know and understand what they were teaching, treat each student individually, make learning central to what happens in a classroom, and manage distractions that prevent learning. Research conducted by the National Foundation of Educational Research in the United Kingdom, investigating boys' underachievement (MacDonald et al., 1999), constructed a similar set of characteristics of a 'good' teacher from the pupils' perspective. These characteristics include high expectations, gives praise, is enthusiastic and fair, and helps students when help is required.

According to Hattie (2009), teacher and student relationships directly influence students' attitude and achievement. Integral to these influences is the role of parent support of students to enable the best possible education. Consequently, it is too one-dimensional to view boys as a homogenous group where all issues apply equally and the guidance of an able teacher is vital. Boys consider a good teacher as one that affirms, listens and respects all students, and importantly, allows them the opportunity to self-regulate and learn from their mistakes (Slade, 2001).

The implementation of 1:1 laptop programs, as reported in the literature, should support the characteristics of effective teaching as described above. Laptops and mobile devices provide options and approaches for boys to engage in a curriculum with relevance and one that is tailored to the needs of a 21st century student. Lingard et al. (2002) reported that boys are drawn to intellectually stimulating work connected to an aspect of their lives and respond to opportunities with intellectual rigour. Flexible learning settings, such as a 1:1 laptop environment that adopts student-directed approaches, have the potential to engage boys in teacher-facilitated environments.

2.6 Parent Perceptions

In terms of the success of 1:1 initiatives, Stidham (2008) proposed that a philosophical foundation must be established where the buy-in of administration and parents is important. Parents may struggle to understand how laptops are used for learning. Parents' perceptions of how laptops are used for learning are often expressed with references to what learning was like for them without laptops. Parents' attachment to conventional approaches of learning with books, pen and paper is often a barrier in 1:1 schools, as parents do not always feel secure with the use of technology (Lei, 2012). It is quite possible, as Zucker and McGhee (2005) revealed, that in some instances teachers avoid using laptops for learning due to their individual preference for using hard copy textbooks and methods more familiar to them from their own experiences which is congruent with the view of some parents.

All of these factors add to the challenges of adopting a community approach and in particular the 'buy in' by parents involved in 1:1 programs. This challenge of involving parents was demonstrated in the research by Shapley et al. (2009) into 21 1:1 laptop schools in the state of Texas in the Unites States, where 71% of schools reported only partial parental and community support after four years of the implementation. Parental support of 1:1 initiatives is important as parents can guide their children with appropriate laptop use whilst assisting in the learning process (Spires, Oliver, & Corn, 2012).

After the completion of a three year study about Internet safety involving parents, students, teachers and health care providers in K to12 schools in the United

States, Moreno, Egan, Bare, Young, and Cox (2013) concluded that a collaborative effort between schools and parents is required to provide consistent education about safety in the digital world. There was agreement amongst all the stakeholders that teaching Internet safety at a young age (between five and eight years of age) and identifying parents as one of the primary teachers of the topic of Internet safety was crucial (Chang, 2010). This view highlights the importance for schools to work collaboratively with parents when using mobile devices for learning.

There is often debate about the increased use of technology and its effect on families, though there is limited research into how technology is used at home (Huisman, Edwards, & Catapano, 2012). Parents can find it difficult to understand what their children may be doing when using laptops at home, creating a source of anxiety and concern (Shepherd, Arnold, & Gibbs, 2006). The use of social media by children in primary and high school is common, and often the dilemma for parents is how to restrict or monitor Internet use at home (Huisman, 2014; Liau et al., 2008). The establishment of E-sites around the world for ICT safety has become more widespread, helping to provide information and strategies to parents about the latest technologies and types of Internet use (Reed, 2008; Wang, Bianchi, & Raley, 2005).

2.7 The Framework for Understanding Student and Teacher Use of Laptops: Measuring Change

The view of learning adopted in this study is defined by the pragmatic view of Dewey (1943) who believed students' interests should involve them in an active curriculum where teachers are responsible for guiding their students in real-life tasks and challenges. However, applying a framework which is consistent with contemporary literature about child-centred learning (Piaget, 1950), the relationship between children's learning and cognitive development (Vygotsky, 1978), and learning with ICT (Jonassen et al., 1999) is complex. More recently, Newhouse and Clarkson (2008, p. 141) have proposed applying 'Learning Environment Attributes' (LEA) in the evaluation of the impact of ICT on learning in school, and importantly to enable schools to record progress in the meaningful use of ICT:

> Learning environments are constructed by the participants and are thus dependent on their beliefs and actions, particularly the underlying pedagogical philosophy of the teacher. Therefore there is considerable variation in the ways ICT may be effectively

> incorporated within a learning environment, and there is no suggestion that a particular option is preferable (i.e. there is no one optimal way of using ICT to teach calculus to a 16 year old).

Often it is difficult for schools and educators to comprehend how to use ICT for learning. The New ICT Supporting Schooling (NISS) framework developed in Australia (Newhouse, 2008a) to provide teachers and schools with a focus on improved student learning through the use of ICT has five dimensions. These dimensions include Student Characteristics, Learning Environment Attributes (LEA), Teacher Professional ICT Attributes, School ICT Capacity, and School Environment. Similar to the research by Newhouse and Clarkson (2008), one of the targeted areas for the current study is concerned with how teachers use laptops from an LEA dimension. The LEA is of value to the study as the focus is on improved student learning through the use of ICT. The LEA dimension of the NISS framework provides teachers and school leaders the opportunity to reflect on the impact of ICT use within a learning environment, to assist teachers in planning to integrate ICT, and to record progress in improving learning with the use of ICT. The five dimensions of the NISS framework with the intended outcomes and components are further elaborated in Table 2.3.

Table 2.3
New ICT Supporting Schooling (NISS) Framework (Newhouse, 2008a, p. 4)

Dimension	Intended outcome of dimension	Components of Dimension
Students	Through the use of ICT, students develop levels of capability, increased learner engagement, and achievement of higher-order learning goals.	ICT capability, engagement, achievement of learning outcomes.
Learning Environment Attributes (LEA)	ICT is used to support teaching to provide learning environments that are centred on learner, knowledge, assessment and the community.	LEA attributes as shown in Table 2.4.
Teacher professional ICT attributes	Successful integration of ICT, exploiting the characteristics of constructivist learning environments, and contribution of relevant learning communities.	Vision and contribution, integration and use, capabilities and feeling.
School ICT capacity	Sound support by the school in terms of relevant software required supporting the curriculum.	Hardware, connectivity, software, technical support, digital resource material.
School environment	A shared community-based vision to support the use of ICT to learn, work and live successfully in a knowledge-based, global society.	Leadership and planning, curriculum organisation, curriculum support, community connection, accountability.

Analysis of the Learning Environment Attributes from Table 2.3 are derived from a measure developed by Newhouse and Clarkson (2008b), called the LOPA (Learning Outcome Pedagogy Attributes) which comprised the following scale: no evidence, developing, routine and comprehensive. A description of these attributes is provided in Table 2.4.

Table 2.4
Description of the Learning Environment Attributes (LEA): Adapted from (Newhouse & Clarkson, 2008, p. 143)

Attribute	Description
Build knowledge through investigating reality	Students investigate real-world issues using a suite of tools to analyse, interpret and present information, building a broad understanding of the topic.
Promote active learning and authentic assessment	Students are actively involved in their learning. Assessment derives from this learning.
Engage students by motivation and challenge	Learning experiences engage, motivate and challenge students individually.
Tools to increase student productivity	Students are supported for maximum productivity with a range of repetitive tasks.
Scaffolding to support higher order thinking	Students knowledge and skills are scaffolded in the development of higher order learning such as application, analysis and synthesis.
Increase learner independence	Allowing students to progress at their own pace through the provision of diverse learning experiences.
Increase collaboration and cooperation	Students are supported to work collaboratively and cooperatively in different learning communities.
Tailor learning to the learner or develop individualised learning pathways	Students are provided with a differentiated experience geared to their own learning needs.
Overcome physical disabilities	Students with physical disabilities are afforded similar opportunities to other students.

Education and pedagogy, in the context of this research is defined as an experimental, child-centred process, where learning is active, and achievements are fluid and moving and changing daily (Dewey, 1943). Therefore in defining pedagogy it is essential to outline how ICT is used by teachers. The use of technology by teachers has changed with its growing complexity and penetration within schools (Bebell, O'Dwyer, Russell, & Hoffaman, 2010). It further highlights the need for teachers to have a robust understanding of how to teach in 1:1 environments and know the curriculum for their students. Shulman (1986) and Mishra and Koehler (2006) discussed that effective teachers must know the subject matter of what is to be taught under the curriculum for effective instructional processes within the classroom.

Additionally, Puentedura's (2006) Substitution, Augmentation, Modification, Redefinition (SAMR) model assists teachers to consider design and integration of digital learning experiences by utilising technology from enhancement to transformational learning experiences. This research model is currently promoted in government schools in Western Australia (DETWA, 2014) and other educational settings as a framework in assisting more meaningful use of mobile devices within learning. The model is aimed at assisting technology adoption and possible enhancement for teaching and learning.

However, Bruce and Levin's (1997) educational technology taxonomy with its four categories of media for inquiry, media for communication, media for construction and media for expression (see Figure 2.1), based on the ordinary instincts of a child as proposed by Dewey (1943), provides the research with a useful framework to analyse student and teacher technology use for learning. This framework underpinned the research conducted by Lei and Zhao (2008) who modified the framework to take into account student use of technologies in their research into the impact of 1:1 laptop learning in a Midwestern middle school in the United States.

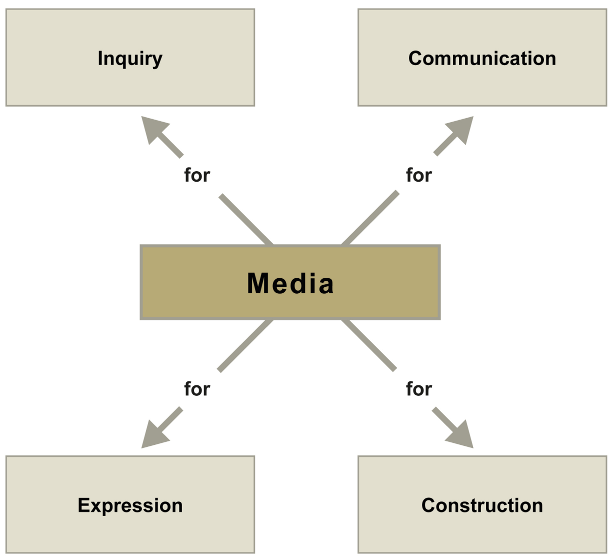


Figure 2.1. **Bruce and Levin's (1997, pp. 85-86) framework for classifying ICT.**

A more recent framework for understanding student use of ICT is the ICT capability learning continuum. The ICT capability learning continuum has been selected to guide this study. The ICT capability learning continuum classifies uses of educational technology with the inclusion of the operational and ethical uses of technology and provides the foundation for an understanding of how students and teachers use technology for teaching and learning for this study. This framework is further supported by the Statements of Learning for Information and Communication Technologies (MCEETYA, 2006) in an Australian context. In Australia, ICT is represented in two ways in the Australian Curriculum (ACARA, 2013): through the ICT capability that applies across all learning areas and with the Technologies curriculum through digital technologies. The ICT capability learning continuum is organised into five interrelated elements as seen in Figure 2.2.

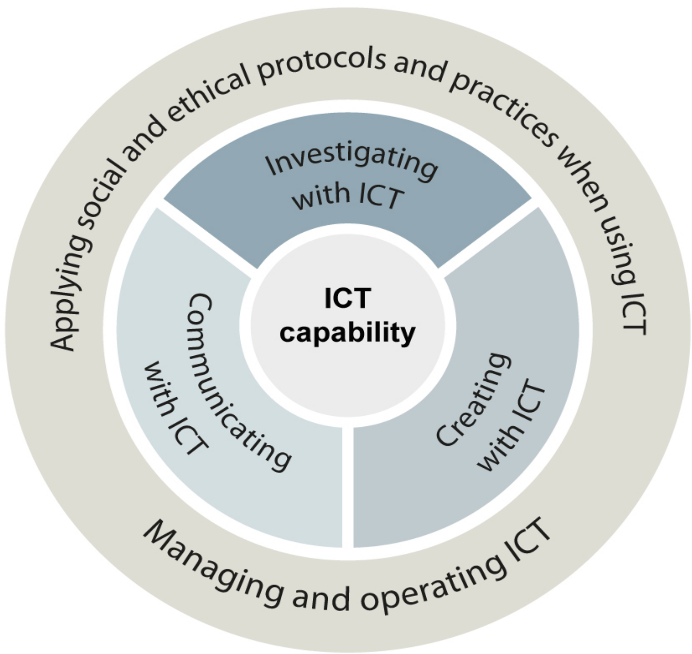


***Figure 2.2.* ICT capability learning continuum (ACARA, 2010a, p. 5).**

At the time of development, the ICT capability continuum was based on international research and includes reference to the ICT curriculum from England, and the National Education Technology Standards for students developed by the International Society for Technology in Education that represent the capability with six sets of standards (ACARA, 2010a; MCEETYA, 2006). From an Australian perspective, the Australian Council for Educational Research had also identified a progression in research associated with the National Assessment Program – ICT Literacy (ACARA, 2014). Table 2.5 sets out the ICT capability as found in the Australian Curriculum with the five interrelated elements (as shown in Figure 2.2) elaborated.

Table 2.5
Organising Elements for How Students use ICT Developed by ACARA (2010a, pp. 5-6) and MCEETYA (2006, pp. 4-5)

Element	Description
Applying social and ethical protocols and practices when using ICT	Recognise intellectual property. Apply digital information security practices. Apply personal security protocols. Identify the impacts of ICT in society.
Investigating with ICT	Define and plan information searches. Locate, generate and access data and information. Select and evaluate data and information.
Creating with ICT	Generate ideas, plans and processes. Generate solutions to challenges and learning area tasks.
Communicating with ICT	Collaborate, share and exchange. Understand computer-mediated communications.
Managing and operating with ICT	Select and use hardware and software. Understand ICT systems. Manage digital data.

The five interrelated ICT elements are grounded in the belief that technologies such as laptops are tools enabling students to complete set tasks, and problem solve. Teachers are, therefore, required to design tasks for students with opportunities to use laptops as a powerful technological tool, aiding learning. How teachers determine the application of the elements could provide important indications on how they see learning taking place in a 1:1 laptop setting. For example, teachers who have a strong reliance on laptop use for investigating with ICT might foster a narrow approach to how laptops could be used for learning, failing to take into account the four other elements.

This chapter thus far has considered an extensive set of literature from past 1:1 laptop implementations, teacher use of laptops for teaching and learning, how students use laptops or mobile devices in both a school and home environment, and how these have had an impact on student achievement and engagement for learning. The conclusions thus far are largely consistent with those reached by Weston and Bain (2010, p. 14) who suggested that there are a range of factors that can affect the potential of 1:1 laptop programs, and the need for understanding the benefits of 1:1 computing can offer:

> The widespread availability of laptop computers can be a driver for more expansive efforts that must happen in order for schools to meet the educational needs for all students. School communities, by adopting a self-organising vision, could contribute to the arrival of a new paradigm for all education.

Jonassen's (2008) continuing research into using ICT as a cognitive tool to enhance meaningful student learning is supported by Ertmer and Ottenbreit-Leftwich (2013) who share a similar view that integrating technology should focus on supporting teachers and students in real-world technology-supported learning environments. The literature suggests that 1:1 laptop programs should take a holistic approach to learning (Lei & Zhao, 2008; Newhouse, 2014; Weston & Bain, 2010). These include students, teachers and leaders all working together, and ensuring that sustained change is everyone's responsibility (Fullan, 2001). As shown in Figure 2.3, teachers, students, leaders and national/state policy are the key cogs in harnessing the potential of laptops for learning.

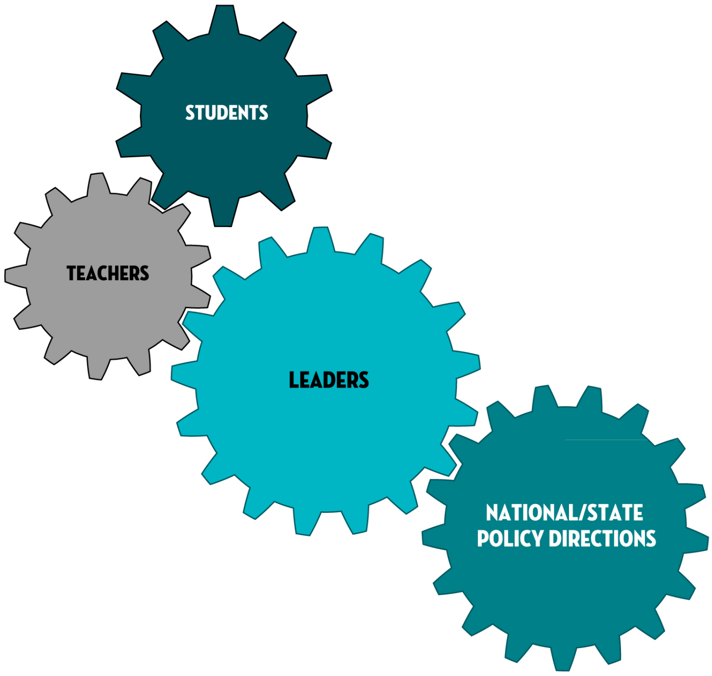


Figure 2.3. **Theoretical framework conceptualising the elements required in harnessing the potential of 1:1 mobile devices for learning.**

The metaphor of 'cogs working in unison' forms the basis of the theoretical framework that informs the study. As discussed above, the implementation of 1:1 laptop programs is often focused on providing students with a personalised approach to learning. With this focus, there is an expectation students are required to be ethical users of ICT, responsible for their learning and aware of the importance of the skill of self-regulation (Cohen, 2012). The idea of metacognitive skills or the awareness of one's own knowledge and self-regulation have been identified in educational literature as a desired trait for a successful learner. In the Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008, p. 8) successful learners are required to "develop their capacity to learn and play an active part in their own learning." According to Zimmerman (1998), self-regulation is a self-management process in which students convert their mental ability to academic skill for attaining their goals. The research comparing self-regulation models conducted by Puustinen and Pulkkinen (2001) emphasised self-regulation as an important factor in the learning process in a behavioural, cognitive and motivational manner. When young boys are provided with a laptop for the first time, the potential to be tempted or distracted by many of the features of a mobile device often becomes a reality.

Additionally, children who have limited self-regulatory skills are at a disadvantage compared to those who have a superior skill at regulating their behaviour (Piotrowski, Lapierre, & Linebarger, 2013).

Lingard, Mills, and Hayes (2000) proposed a framework for thinking about an appropriate environment for engaging students in higher-order learning and problem solving activities that is based upon providing a supportive classroom environment. Creating an effective classroom experience when using laptops could be viewed as a priority. McMahon's (2009) investigation into higher-order thinking skills in a 1:1 laptop school in a Western Australia secondary school suggested that for students to develop such skills, they need to integrate technology across all learning areas, enabling the attainment of higher levels of cognition.

2.8 Conclusion

The literature has shown that 1:1 laptop programs have a range of impacts on teachers, students, parents and ultimately, school communities. Over time, the classroom environment has changed, and teachers have shifted towards constructivist learning, where an increase in student-centred activities, collaboration and differentiation have played a part in engaging and motivating learning for boys. Research has also found that since the inception of 1:1 laptop programs, inappropriate use of laptops in classrooms has become a major topic of discussion (e.g., digital gaming). Research into the effectiveness of 1:1 program as measured by standardised testing has been inconclusive as to whether 1:1 laptop programs have had any impact, either positive or negative on improved academic skills. One to one laptop programs can fundamentally change teaching and learning approaches. However, the complexity of 1:1 teaching and learning is exemplified by the need for more creative assessment approaches to determine the real impacts of 1:1 laptop programs.

This chapter has reviewed the literature about 1:1 laptop programs by discussing the roles of teachers, students, parents and schools when implementing 1:1 initiatives. It proposes a 'framework of pedagogical evaluation' in terms of an overall broad context, encompassing a range of factors required to harness the potential of 1:1 mobile devices for learning. Table 2.6 presents the concepts proposed to respond to the study's research questions.

Table 2.6
Mapping of Conceptual Ideas to the Study's Research Questions

Research questions	Frameworks	Reference in this chapter
1. How do boys utilise their personal laptops?	Student use (ACARA, 2010a; Bruce & Levin, 1997)	Figure 2.2 and Figure 2.1
2. How are teachers engaging laptop technology for educational purposes?	Teacher use (ACARA, 2010a; Bruce & Levin, 1997; Harris et al., 2009; Newhouse & Clarkson, 2008; Shulman, 2005)	Figure 2.2 and Figure 2.1
3. What educational impact if any, did the 1:1 laptop program have on literacy and numeracy outcomes?	Student literacy and numeracy outcomes. NAPLAN analysis. Maximising the impact of ICT use. (Newhouse, 2008a) (ACARA, 2014)	Table 2.3 and Table 2.4
4. What differences can be identified between junior and middle school	All	Figure 2.2 and Figure 2.1
5. What implications do the findings from research questions 1, 2, 3 and 4 have for future inclusion of one to one laptop or mobile learning devices in schools?	All	Figure 2.3

This research aims to provide an improved and current high-level understanding of how male students use laptops for learning. It does not aim to deliver all the answers to the questions related to the effects of 1:1 mobile devices on student learning mentioned in the literature. However, in answering the study's research questions, this thesis aims to generate new knowledge and make a positive contribution to the growing literature base on 1:1 laptop implementations.

The next chapter will present the methodology that supports the research.

CHAPTER 3. Methodology

3.1 Chapter Overview

The formation of the research methodology draws upon elements from the three research domains of Brinberg and Kidder (1982) being conceptual, methodological and substantive which are integral to this thesis. These three domains informed the research and helped to determine the instruments and techniques for the method adopted to respond to the research questions. This chapter further explores the issues expressed in Chapter One and re-states the research questions, it then articulates how the research is situated within the pragmatic paradigm, reflects upon the role of the researcher, and recognises the limitations of the research. The chapter concludes with a consideration of the ethical issues associated with a study of this size and complexity.

3.2 The Area of Focus: ICT – Friend or Foe?

Chapter One articulated that the use of laptops in schools across the world had prompted some sections of the educational community to question the value and effectiveness of the widespread introduction of 1:1 laptop programs in schools (Cuban, 2006). Lei and Zhao (2008) argued that there are a range of educational factors that can effect student outcomes and expose the lack of evidence to support the contention that 1:1 laptop programs can make a contribution to academic attainment. Some of these factors relate to the users, the technology, pedagogical practice, constantly changing interactions and mutual influences.

With the Federal Government in Australia in recent years having a distinct strategic technology plan for implementing a 1:1 computer ratio in all schools for students in Years Nine to Twelve, assumptions about the effectiveness of 1:1 initiatives are open for discussion (DEEWR, 2009). For example, Warschauer (2005) reported on the study of ten schools in Maine and California with a range of students from grades three through twelve, finding no increase in test scores to link to the use of the 1:1 laptop program.

Students currently coexist with various forms of ICT in everyday life; however with an increasing exposure to ICT in schools, views of whether this approach enables or inhibits learning is a dilemma faced by many educators across Australia and the world. With such a thrust of ICT integration across the world, all stakeholders in the educational process will inevitably monitor its use stringently. However, Weston and Bain (2010) are of the view that there is no reason why educators would question the value of using a laptop at school, as laptops have become integrated into what students do and are tools that should be used as a part of learning (Senge, 2000). The majority of 1:1 laptop research to date has not been gender specific, whereas this study has a specific focus into boys' education and the use of laptops.

3.3 Research Questions

This research aimed to investigate longitudinally, the implementation of the 1:1 laptop program at the case study school. This school is a Catholic school for boys founded in the Edmund Rice tradition in Perth, Western Australia. The research focused on students in Year Five in the Junior School (primary school), who at the inception of the study were aged 10 to 11 years of age. The research also focused on Year Seven students in the Middle School (secondary school), who at the inception of the study were aged 12 to 13 years of age. The research tracks these cohorts over three years (2010 to 2012).

Five research questions guided the investigation, namely:

1. How do boys utilise their laptops for learning?
2. How are teachers engaging laptop technology for educational purposes?
3. What educational impact if any, did the 1:1 laptop program have on literacy and numeracy outcomes?
4. What differences can be identified between junior and middle school implementation experiences in regard to research questions 1, 2 and 3?
5. What implications do the findings from research questions 1, 2, 3 and 4 have for the future inclusion of 1:1 laptop or mobile learning devices in schools?

These research questions are now discussed in detail.

3.3.1 Laptop use for boys

Research question one examines student use of ICT and their perceptions of the laptop program. Types of use, underlying attitudes, and levels of motivation and engagement complement the research undertaken by Won Hur and Oh (2012) who looked at learner engagement and student achievement with a male only cohort. It is beneficial to understand what boys use their laptop for and how they use their laptops for their own learning to ascertain the possible impacts. Students need to be highly skilled in the use of ICT, as recognised in the *Melbourne Declaration on educational goals for young Australians* (MCEETYA, 2008) and by the OECD in the *Learning to change: ICT in schools* report (OECD, 2001), and assessing the effects of ICT in education report (OECD, 2009a).

3.3.2 Teachers engaging laptop technology for educational purposes

Research question two provides a detailed perspective of the teachers' viewpoints of the implementation of the laptop program in reference to how laptops may be used in their own classes. Furthermore, it is essential to describe the pedagogical beliefs of teachers and how these might shape the use of ICT in the curriculum (Zucker & King, 2009). This research question also considers the importance of how laptops may engage and challenge students in the area of digital literacy (Gabriel, 2010). By addressing this question, a clearer understanding of how teachers use ICT to connect teaching and learning will lead to knowledge of what methods may or may not be used in daily teaching with the aid of ICT.

3.3.3 Educational impact on boys' education

Research question three acknowledges the need for further research to describe teacher and student practices with ICT and the way in which these impact on outcomes (Newhouse, 2008b; Penuel, 2006). This research question will also help to build on research into educational benefits and effect on learning conducted by Borja (2006), Jaillet (2004) and Lei and Zhao (2008). With a specific lens focussing on boys' education, this question will gauge the educational impact of the 1:1 initiatives, with a specific emphasis on literacy and numeracy. It is recognised that the academic improvements of girls have outstripped those of boys in past and recent times (Francis, 2000; Latsch & Hannover, 2014; Rowe & Rowe, 2002). The study, therefore is also interested in determining whether incorporating ICT into pedagogy can help boys engage in meaningful learning (Sokal & Katz, 2008).

3.3.4 Differences between junior and middle school 1:1 laptop implementation experiences

Research question four addresses possible contextual issues that may affect the implementation including behavioural, developmental and context-specific factors, and the implications for the future inclusion of 1:1 laptop programs in schools. It also considers methods and models of implementation and specific levels of development that may have a direct impact on results and outcomes (Holcomb, 2009).

3.3.5 Implications for the future implementation of 1:1 laptop programs

Research question five brings together key themes to emerge from research questions one to four and presents some issues for consideration in future implementations of mobile learning in schools. Of significance is the nature of how initiatives can be supported, addressing areas of learning, teaching and engagement as described by Donovan et al. (2010).

3.4 Research Approach

3.4.1 Mixed methods approach: Qualitative and quantitative research

A mixed methods approach allows the research to investigate the research questions in detail and with clarity by selecting the best available techniques (Tashakkori & Teddlie, 2010). According to Johnson, Onwuegbuzie, and Turner (2007, p. 123) mixed methods research:

> … is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.

The study had a specific objective of understanding the implementation of a 1:1 laptop program in an educational setting at an all boys' school in Western Australia. It monitored the progress of 192 students and their families, and teachers over a three year period. These 192 students comprised 56 Year Five students and 136 Year Seven students who were new to the 1:1 laptop program in 2010, a new initiative for the School. Also of significance was the cohort of teachers involved in this study. Teachers were surveyed and interviewed according to their direct teaching involvement with the two cohorts, either in the junior or middle school.

The research used a variety of quantitative techniques to gather data from students', teachers' and parents' on their views on engagement, ICT competencies, the integration of ICT into the curriculum, and teachers' pedagogy in the use of ICT. To obtain insight on laptop use, a questionnaire was administered annually over the three year period of the study. Qualitative techniques were also adopted through the coordination of interviewing, focus groups and class observations. Both qualitative and quantitative techniques were strengthened by the triangulation of the data, highlighting the sentiments expressed by O'Dwyer and Bernauer (2014, p. 5) that, "numbers and words need not collide!"

Students were involved in a diverse curriculum requiring student movement to and from classes with their laptops encompassing an array of experiences with laptops within a junior or middle school setting. From the 192 student participants a sub-group of 30 student participants (10 Junior and 20 Middle School student participants) took part in an interview process. This sub-group provided further detailed information about laptop use, engagement, motivation and impacts on learning. The selection of these student participants is discussed in the purposeful sampling section of this chapter. Student participants from the junior school (students from Year Five in the first year of the study continuing to Year Seven in the third year) are referred to as Cohort A in the research. Similarly, student participants from the middle school (students from Year Seven in the first year of the study continuing to Year Nine in the third year) are referred to as Cohort B.

3.4.2 Paradigm: Pragmatism

A pragmatic paradigm underpins the research drawing on many ideas, with the researcher employing "what works," using diverse approaches, and valuing both objective and subjective knowledge (Creswell & Plano Clark, 2007). Pragmatism is not the sole philosophy or paradigm associated with mixed methods research, but it is the main one (Tashakkori & Teddlie, 2003). As Denzin and Lincoln (2005, p. 53) state: "the core reflection process is connected to action outcomes that involve manipulating material and social factors in a given context."

Pragmatism is a strong philosophical foundation for mixed methods research (Creswell & Plano Clark, 2007). It is posited that a pragmatic approach is best suited for understanding the various perspectives of a 1:1 laptop program and enabling for sound analysis of the data. Biesta's (2010, p. 97) depiction of Dewyan pragmatism exemplifies the focus for the research in producing useful knowledge:

> Pragmatism should not be understood as a philosophical position among others, but rather as a set of philosophical tools that can be used to address problems - not in the least problems created by other philosophical approaches and positions. One of the central ideas in pragmatism is that engagement in philosophical activity should be done in order to address problems, not to build systems.

Consequently, the debates that have existed between positivist and constructivist traditions have tended to highlight distinctions between qualitative and quantitative approaches with each side endeavouring to expose and defeat one another's assumptions (Alexander, 2006). The research is, "not troubled by the incommensurable philosophical assumptions between paradigms" (Greene, 2007, p. 82); rather it is focused on a pragmatic paradigm that embraces qualitative and quantitative traditions to advance knowledge creation.

Multiple data collection techniques such as questionnaires, interviews, focus groups, observations, the collection of National Assessment Program for Literacy and Numeracy (NAPLAN) data and artifacts were combined to assist the longitudinal nature of the research by providing the researcher with examples of how a 1:1 laptop program may or may not enhance learning for boys.

3.5 Research Design

3.5.1 Research model

Students, teachers and parents responded to annual questionnaires and the sub-groups from Cohort A and Cohort B were interviewed annually over three years. Also conducted over the same period were classroom observations and focus groups; these techniques provided insights into how the 1:1 laptop program had an impact upon learning for boys. External artifacts such as NAPLAN and eSafe monitoring reports were used to contribute to the research. Methods of data collection including sampling techniques are discussed in Section 3.6. Figure 3.1 highlights the research model.

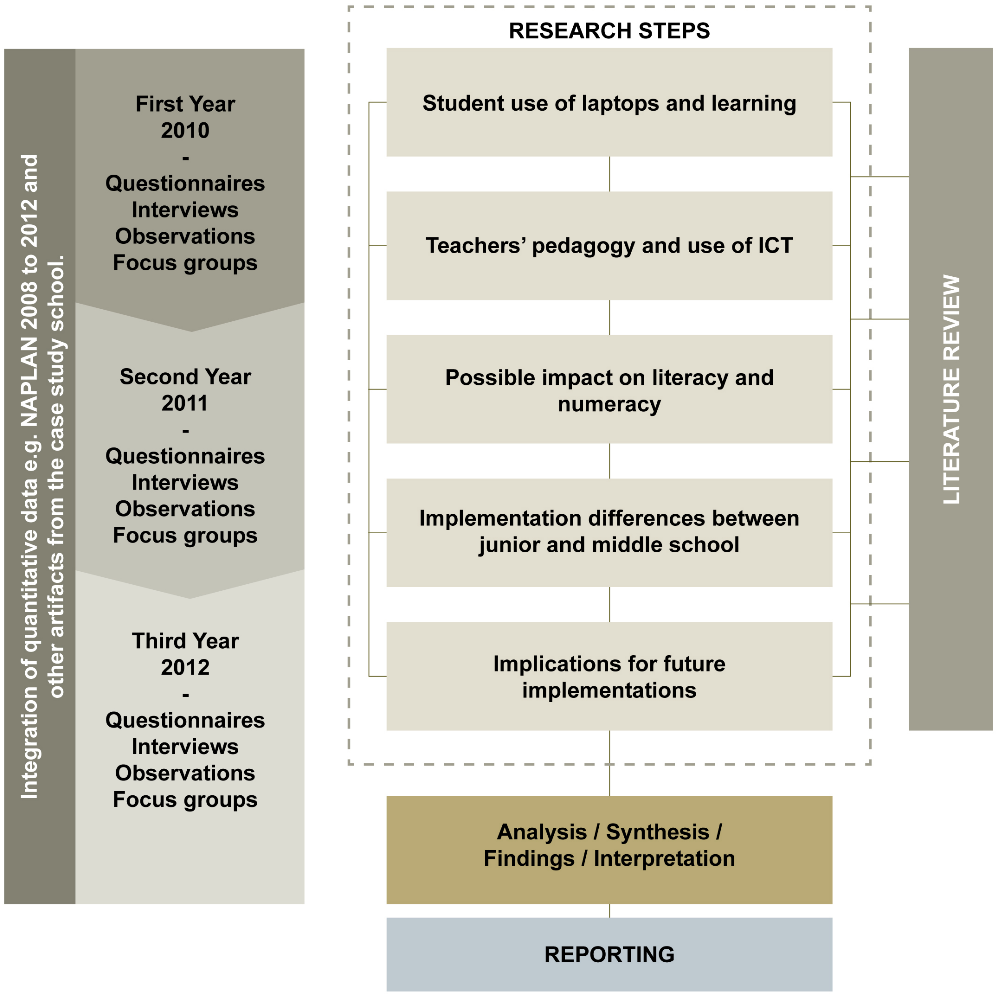


Figure 3.1. **Research model summarising the steps of the research.**

3.5.2 Sequence of research

Figure 3.1 articulates the specific focus areas of the study and details the data collection methods. The first four steps were specifically linked to the data gathering instruments, whilst the final step was concerned with in-depth analysis derived from the findings from the first four steps. Throughout all five steps of the research the following instruments and methods were used: questionnaires, interviews, observations, focus groups, NAPLAN analysis and secondary sources including artifacts from the case study school.

All of the steps used in this research were integral in guiding the study across the three year period. Steps one, two and four occurred at annual intervals over the course of the research. Step three leveraged annual national assessment data on literacy and numeracy for the School. Step five synthesised data collected from steps one to four, appraising findings in the context of contemporary literature. With limited literature detailing laptop use in boys' education in comparison with National performance benchmarks, an all-encompassing approach of available literature of laptop and ICT use was used to support the research.

3.5.2.1 Step one: Student use of laptops and learning

There has been significant research into the impact of 1:1 laptop programs in the last 10 years, particularly in relation to student learning. Russell, Bebell and Higgins (2004) reported that in 1:1 classrooms where technology was used more, student engagement and motivation was higher. Targeted areas in this section are:

- learning: general knowledge and generic skills (e.g. problems solving and communication);
- role of the student in the learning community;
- student productivity measures (time on task);
- cooperative learning tasks;
- digital literacy;
- development of knowledge of learning;

- interest in work;
- student satisfaction; and
- attendance, participation and the classroom experience.

The student questionnaire and interviews played an important role in unpacking the students' views of these targeted areas. Ascertaining what students used their laptops for was necessary to draw closer links to their learning and determine their competencies. The targeted areas were:

- understanding basic operations and concepts of ICT;
- understanding ethical and social issues with the use of ICT;
- use of productivity tools for creating with ICT;
- use of ICT communication tools to scaffold learning;
- use of ICT for inquiry and research; and
- use of ICT for problem solving.

The research used the ICT capability learning continuum (ACARA, 2010a) to conceptualise the construct of student use of ICT. It adopts the five organising elements of the continuum, these being: applying social and ethical protocols and practices when using ICT, investigating with ICT, creating with ICT, communicating with ICT and managing and operating ICT, to determine laptop use by teachers and students. This continuum is also central to the work of Bruce and Levin (1997) and their taxonomy for learning with ICT covering the areas of: inquiry, communication, construction and expression. The annual student questionnaires (Appendix A) and interviews (Appendix C) were the instruments used to determine student participants' use of laptops for learning. Additionally, classroom observations (Appendix K) took place annually to observe laptop use for learning. Parent questionnaires (Appendix F) and parent focus groups (Appendix I) also took place annually to establish parent perceptions about the 1:1 laptop implementation. These instruments are discussed in Section 3.6 Data Collection.

3.5.2.2 Step two: Teachers' pedagogy in the use of 1:1 laptops

Step two was concerned with how teachers used ICT as part of their teaching each day. How technology is used in a pedagogically meaningful way, reorganisations in the processes of teaching, studying and learning are required by the researcher to interpret this section (Sipila, 2010).

An annual questionnaire delivered online through SurveyGizmo helped determine how the teacher participants used laptops for teaching and to promote student learning. Appendix B presents the teacher questionnaire. As with the student participants, the following constructs were targeted for the teacher participants:

- teacher attitudes and beliefs about laptop use for learning;
- how students managed and operated ICT;
- how students used ICT to investigate phenomena;
- how student used ICT for creation purposes;
- how students used ICT for communication; and
- how students used ICT ethically.

These constructs were used at the annual teacher interviews to tease out issues that were reported in the annual teacher questionnaires. Interviews are conversations and explanatory interviews (whether semi-structured or focused) are much more like a natural conversation than an interview schedule and aid in addressing teacher pedagogy in the use of ICT (Williams, 2003).

3.5.2.3 Step three: Possible impact of 1:1 laptops on literacy and numeracy outcomes

Step three was interested in discerning possible impacts on learning with a specific focus on literacy and numeracy. There has been significant research about 1:1 laptop use and the impact on specific academic areas and student achievement (Bebell & Kay, 2010; Bebell & O'Dwyer, 2010; Dunleavy & Heinecke, 2007; Muir et al., 2004; O'Dwyer et al., 2008; Suhr et al., 2010). Weston and Bain (2010) use Cuban's (2006) approach of carefully scrutinising portrayed improvements in student achievement with a focus on teaching rather than on a device. This is the debate that challenges these interpretations, and more importantly shapes this research. NAPLAN, which is standardised, was chosen as the main indicator to analyse the possible impacts on literacy and numeracy outcomes. It is an assessment widely known in the Australian school system and is often discussed in schools, communities and political forums in Australian society. Subsequently, NAPLAN data between 2008 to 2012 was gathered to determine if there was any relationship between the 1:1 laptop initiative and literacy and numeracy outcomes.

3.5.2.4 Step four: Implementation differences between junior and middle school

To understand the differences between the implementation of the laptop program, three subgroups were formed from Cohort A, Cohort B and teacher participants. Details on how these subgroups were formed are provided in Table 3.3. These subgroups comprised participants who were interviewed annually to establish if there were specific differences or similarities. Appendix C provides student and teacher interview questions. Teacher and student participants were also observed annually using a protocol developed by Judson (2006) over the three year study. Classes selected for observation were based on the participants who were involved in the study each year (both teachers and students). Semi-structured interviews of the School Headmaster, Deputy Headmaster and the Director of ICT occurred in the first year and third year as the three participants were not attached to a classroom-teaching role to justify annual interviews based on the research questions. The Dean of Academic Studies was interviewed annually as he had a closer link to the daily operation of the School, particularly in relation to the implementation of the 1:1 laptop program. These four individuals held positions of responsibility and were integral strategically and operationally in the 1:1 laptop implementation process and are referred to collectively as the School leadership team. The purpose of collecting data from the School leadership team was to set the 1:1 laptop implementation within a strategic framework noting differences between planned and actual outcomes. Appendix D provides the interview questions used for the School leadership team.

3.5.2.5 Step five: Implications of the 1:1 laptop initiative for future use of ICT

Finally, step five examined the implications of introducing a 1:1 laptop program. Bringing together all of the data (interviews, questionnaires, observations, focus groups, NAPLAN data, and artifacts) and then analysing these data in the context of current literature, leads to deeper understandings into the implementation of ICT use through laptops or other mobile devices. Concentrating on the five specific steps, also helped to describe and explain changes in the implementation of the 1:1 laptop program.

3.6 Data Collection

3.6.1 Data collection techniques

This research used a mix of qualitative and quantitative techniques for data collection. These included: questionnaires, interviews, observations, focus groups, sources such as NAPLAN and secondary artifacts from the School (e.g., eSafe reports). Table 3.1 provides an explanation of the link between methods of data collection and the research questions.

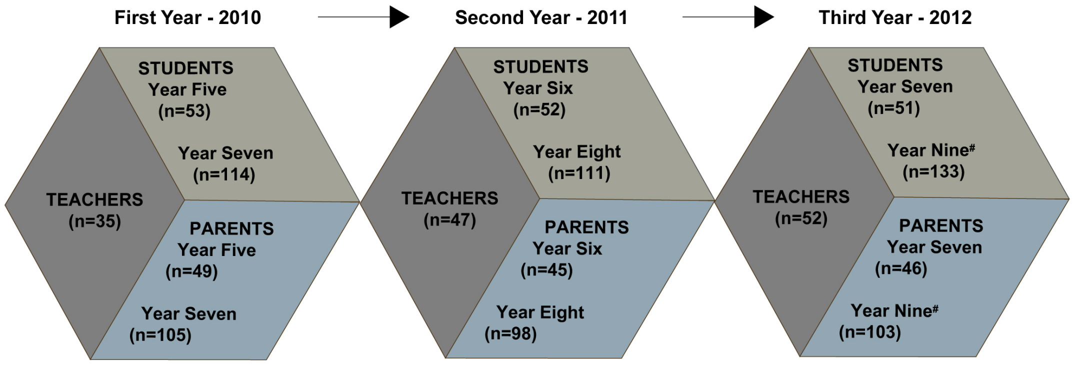
Table 3.1
Data Collection Methods and Research Questions

Research questions	Data collection method	Research questions
1,2,4	Student questionnaire	This questionnaire addresses research questions 1, 2 and 4 with a direct focus on students in the study about the use of laptops and learning.
1,2,4	Teacher questionnaire	This questionnaire addresses research questions 1, 2 and 4 with an emphasis on the teaching and learning aspects of the implementation.
1,2,4	Parent questionnaire	This questionnaire addresses research questions 1, 2 and 4 with an emphasis on parent perceptions of the 1:1 laptop implementation.
1,2,3,4,5	Teacher and student interviews and, parent focus groups. Director of ICT interview Dean of Academic Studies interview School Deputy-Headmaster interview School Headmaster interview	Interviews provide further information about research question 1, 2, 3, 4 and 5 with specific reference to the implementation experiences between the junior and middle school.
1,2,4	Observations	Observations provide further information about research questions 1, 2 and 4.
3	Collection of artifacts from the school (e.g., NAPLAN data, lesson plans etc.)	These address research question 3.

3.6.2 Research and data collection overview

Commencing in 2010 with Year Five (Cohort A) and Year Seven (Cohort B), the study followed Cohort A participants to Year Six in 2011 and Year Seven in 2012; and Cohort B participants to Year Eight in 2011 and Year Nine in 2012. Also included in the data collection were teachers from both cohorts and parents. By following these cohorts, and triangulating these data with perceptions from teachers and parents, the study could address the research questions. Qualitative and quantitative data were collected about how students and teachers used laptops, and educational impacts and differences between junior and middle school implementation experiences from both laptop year levels.

Figure 3.2 provides an overview of the number of student, teacher and parent participants who responded to the questionnaires over time for both cohorts. Table 3.4 provides response rates for all questionnaires over the three years of the study.



Note. # Response rates for students in Year Nine in the third year seemed to improve, perhaps due to the 1:1 laptop program gaining momentum.

Figure 3.2. **Number of participants responding to questionnaires throughout the study (2010 to 2012).**

Both Cohort A and Cohort B remained the same in sample size for both students and parents from the first year to the third year. Teacher numbers varied each year due to teacher involvement across the specific year levels over the course of the study. Table 3.2 shows the data collection timeline and total number of questionnaires conducted.

Table 3.2
Data Collection Timeline: Total Sample of Questionnaires

Data collection Instrument	Inception# (2010)	(Year) First (2010)	Second (2011)	Third (2012)
Student questionnaire	Mar (N = 192)	Oct (N = 192)	Oct (N = 192)	Oct (N =192)
Teacher questionnaire	Mar (N = 46)	Oct (N = 46)	Oct (N = 56)	Oct (N = 61)
Parent questionnaire	Mar (N = 192)	Oct (N = 192)	Oct (N = 192)	Oct (N = 192)

Note. Inception# = Data collection phase instituted at the commencement of the 1:1 laptop implementation (March / April 2010).

As discussed, annual interviews, observations, parent focus groups and student gaming forums were utilised over the course of the study. A total of 30 student participants (10 from Cohort A and 20 from Cohort B) were interviewed at the inception, first year, second year and in the third year from the total of 192 students involved in the study to discover how laptops were being used. There were 102 teachers at the School, however those teachers who taught more than six periods (the minimum number of periods teachers needed to fully appreciate the impact of the 1:1 laptop program) a week and taught students either in Cohort A or Cohort B were selected for an annual interview. These interviews were conducted to ascertain how teachers used the laptops for learning rather than focusing solely on the implementation. The School leadership team, as previously discussed in section 3.5.2.4, were also interviewed for the purpose of gaining insights into their perspectives of the 1:1 laptop implementation. Observations also took place each year for the purpose of understanding how students and teacher used laptops for learning (this is discussed in further detail in section 3.6.7). Parent focus groups were designed to tease out some of the reported themes that became apparent post the parent questionnaire. Finally, one of the themes to emerge from student questionnaires and interviews; gaming, presented an opportunity for the study to conduct five student gaming forums to further examine the issue. Involving 30 students from Cohort A and Cohort B five forums were run. Selection methods are discussed in further detail in Table 3.3.

3.6.3 Sample

3.6.3.1 Background of sample and method of selection

Students, parents and staff involved with Years Five (Cohort A) and Year Seven (Cohort B) in the implementation year took part in this longitudinal study. Both Cohort A beginning in the Junior School, and Cohort B, in the Middle School, were studied simultaneously between 2010 and 2012. The research aimed to gain a greater understanding of how students used laptops for learning and how teachers implemented strategies for students to use their laptops in learning. Cohort A and Cohort B were selected for the study as these two were pioneers in the implementation of the 1:1 laptop program. Table 3.3 summarises data collection selection methods, and sample size.

Table 3.3
Total Sample Size and Selection Methods of the Study

Data Collection Method	Sample Size	Selection Method
Questionnaires:		
Cohort A student questionnaires	56	All students in Cohort A were asked to complete a student questionnaire annually.
Cohort B student questionnaire	136	All students in Cohort B were asked to complete a student questionnaire annually.
Teacher questionnaires	72	All teachers who taught across Cohort A or Cohort B were asked to complete a teacher questionnaire annually.
Parent questionnaires	192	All parents of Cohort A and Cohort B students from the implementation year were asked to respond to a parent questionnaire annually.
Cohort A student semi structured interviews	10	Purposeful sampling targeting students using the maximal variation strategy (students from high, middle and low achievement levels).
Cohort B student semi structured interviews	20	Purposeful sampling targeting students using the maximal variation strategy (students from high, middle and low achievement levels).
Semi structured interviews:		
Teachers	37	Teachers who taught six or more periods a week to Cohort A or Cohort B. This number was selected as a threshold having a greater connect with both Cohort A and Cohort B.
Leadership team	4	The School leadership team consisted of the: Headmaster, Deputy-Headmaster, Dean of Academic Studies and the Director of ICT.
Parent focus group	192	Parents from both cohorts were invited to take part in focus groups annually via the annual parent questionnaire.
Student gaming forum	30	Student participants from Cohort A and Cohort B interview sample.

Students, teachers and parents from both cohorts were invited to be involved in the study by completing an annual questionnaire, and signing a statement of informed consent. Parents were invited to be involved in the research because they could provide a valuable perspective on how students used their laptops for learning, particularly at home. Parents were also asked to authorise student involvement, as students were under the age of 18, by signing a statement of informed consent

(Appendix E). These forms were signed at the 1:1 laptop deployment session, which took place in the first year of the study. Three separate questionnaires (student, parent and teacher) were administered online to all 196 students, their parents, and the teachers involved with each of the cohorts. The questionnaires were introduced to participants by email. Table 3.4 provides the responses rates for the student, parent, and teacher questionnaires. Parent responses increased as the 1:1 laptop initiative gained momentum.

Table 3.4
Participant Response Rates for the Annual Student, Parent and Teacher Questionnaires

Cohort	Inception# %	First Year %	Second Year %	Third Year %
Student Cohort A	100.0	96.4	92.9	91.1
Student Cohort B	100.0	83.8	81.6	97.8
Parent Cohort A	62.5	87.5	80.4	82.1
Parent Cohort B	52.9	77.2	73.5	75.7
Teacher	84.8	76.1	83.9	85.2

Note. Inception# = Refers to the initial questionnaire that took place one month after the implementation in the first year of the study (March 2010). Annual questionnaires were completed at the end of each year.

3.6.3.2 Purposeful sampling: Student and teacher interviews

Purposeful sampling ensured that all chosen interviews carefully represented the School community as closely as possible, "illuminating" the research questions (Patton, 2002). Students selected for the sample group followed the maximal variation strategy from high, middle and low academic rankings to capture a range of perspectives into how laptops were used for learning. The achievement ranges were based on historical artifacts such as NAPLAN. The sampling also provided a range of perspectives to see if there were any differences between the cohorts with the implementation of the 1:1 laptop program. Teachers were selected on the basis of having a teaching load of six periods or more across all learning areas taught at the School relevant to the groups. As discussed this teaching commitment was judged as the minimum required for teachers to have a sufficient connect with 1:1 laptop initiative. Therefore, the student sample remained consistent over the period of research. However, a different set of teachers were interviewed each year depending on their commitment to their sample. Further, the extent of consistency of parents involved in the research depended upon them attending the focus groups.

3.6.4 Questionnaires

Student, teacher and parent survey questionnaires were administered each year. These were set up to collect data at specific yearly intervals over the three year period to discern if there were changes in participants' perceptions of the 1:1 laptop implementation. Survey questionnaires comprised quantitative and qualitative components which enabled the research to gain access to data representing attitudes and opinions towards the implementation of the 1:1 laptop program. Appendices A, B and F provide the questionnaires administered to students, teachers and parents. In longitudinal research, questionnaires are useful to gain insights into possible changes to attitudes and behaviour (Vandenberg & Ployhart, 2010). The School leadership team were also surveyed over the three year period to collect data about learning and teaching using 1:1 laptops from the leadership perspective.

3.6.4.1 Formation of the questionnaire: Students, teachers and parents

The questionnaires used in this study drew upon previous instruments developed by Newhouse (2005) who conducted research for the Western Australian Department of Education and Training in the area of using notebooks for learning. Newhouse's (2005) questionnaires were further developed for this study, specifically relating to the dimension of 1:1 laptop learning. Newhouse targeted the areas of student engagement, impact on learning outcomes, teachers' pedagogy and teacher and student ICT competencies. By utilising the framework employed by Newhouse, a comprehensive and tested form of data collection was adapted as a basis for the study. The original design of the questionnaires catered for students, teachers, key leaders and parents in a public school setting in Western Australia.

In developing the questionnaire for this study, 10 constructs were identified as being important in understanding laptop use for teaching and learning with varying questions in each questionnaire (student, teacher and parent). Newhouse (2005) drew on a range of questions that he classified as "key performance indicator data" to help determine notebook use in his research. The following 10 constructs demonstrate the type of responses for all questionnaires:

1. Laptop use: (Five point Likert-type scale: Everyday, Two to three times a week, Every two weeks, Once a month, Never)

2. Laptop use for teaching and learning: (Five point Likert-type scale: 0-5%, 5-10%, 10-25%, 25-50%, >50%)

3. Student engagement and motivation: (Five point Likert-type scale: 1 Low to 5 High)

4. Feelings and experience using ICT: (Four point Likert-type scale: Often, Sometimes, Rarely, Never)

5. Frequency of use in time: (Five point Likert-type scale: less than 30 minutes, 30 minutes, One hour, Two to three hours, More than three hours)

6. Student observation: (Yes or no responses with written comments)

7. ICT competencies: (Three to four point scales using exemplars of what can and cannot be completed in the ICT competency)

8. Impact on learning: (Five point scale: High to low or seven point scale: 3, 2, 1, 0, -1, -2, -3).

9. Other technologies: (Written or open ended comments)

10. 1:1 laptop program statement: (5 point Likert-type scale: Strongly agree, Agree, Don't know, Disagree, Strongly disagree).

Four questionnaire iterations took place over the three year study. These are explained below:

- An initial (inception) set of questionnaires were administered to the students, teachers and parents soon after the implementation of the 1:1 laptop program. This set of questionnaires provided background information about the students, teachers and parents. The student questionnaire contained 13 items, the teacher questionnaire contained 50 items and the parent questionnaire contained seven items (Appendix G).

- An annual questionnaire was administered to the student, teacher and parents at the conclusion of Year One of the study. The composition of the three questionnaires about the 1:1 laptop program was: 25 item annual student questionnaire, 26 item teacher questionnaire, and a 12 item annual parent questionnaire.

- The annual questionnaire remained consistent for the student participants. However, with the analysis of the data, the themes of mobile telephony, gaming, distractions of using laptops for learning and monitoring of laptops emerged as themes consistent for both parents and teachers and additional items were included in their questionnaires. Therefore the composition of the Year Two and Year Three questionnaires were as follows: 25 item annual student questionnaire (including four qualitative), 28 item teacher questionnaire (including two qualitative items), and 19 item parent questionnaire (including four qualitative items).

In summary, the annual questionnaire changed for both the teachers and parents from the first year to the second year of the study due to the emergence of the consistent themes discussed above. Changes to the questionnaires were studied and reviewed by to two university academics for authenticity and relevance. Appendix H provides a summary matrix of the Cronbach's Alpha results yielded by applying Reliability Analysis to the three Questionnaires in their final form. The results indicate that the multiple-Item 'Themes' (constructs) had satisfactory levels of reliability.

3.6.4.2 Field test of the student questionnaire

As discussed, two university academics examined all items of the questionnaire to help ensure congruency between the data collection instruments and the study's research questions. With a focus on the student questionnaire, a rigorous examination of the questions and scales used for each area ensured that each key area was clear and concise. The teacher and parent questionnaires were also peer examined following the above mentioned process.

Twenty students from Years Five and Seven from the case study school were used as a pilot group in December 2009 to complete the questionnaires and provide written feedback on the design and structure of the questionnaire used. SPSS (v.20, IBM, USA) was used to gauge questionnaire reliability, by calculation of Cronbach's Alpha for each of the multiple-Item questionnaire 'Themes' (constructs).

3.6.5 Interviewing

A semi-structured interview technique was adopted for the study, which allowed the researcher to engage participants in a conversational dialogue about the 1:1 laptop implementation and the effect on boys' education. All interviews were audio recorded by the researcher and then transcribed. The semi-structured interviews consisted of a series of questions in the form of an interview schedule but the sequence could be varied. To acquire detailed information about the 1:1 laptop program and participants' responses, a sample of teachers and students were interviewed as previously discussed. All parents from each cohort were invited to an annual focus group to respond to a range of questions pertaining to the 1:1 laptop program.

Questions were general and provided for the interviews to have some scope to ask further questions from given responses that were seen as noteworthy (Bryman, 2008). Appendix C presents the student and teacher interview questions, Appendix I presents the parent focus group questions, and Appendix J presents the student gaming forum which was convened specifically to confront the perceived problem of student gaming during school hours. The proportion of sample numbers as previously shown in Table 3.3 displays the total population of the research group. The sample may be considered appropriate, as single case study sites need less of an emphasis of having large samples due to the difficult nature of having to configure complex plans (Punch, 2009).

Teachers who taught more than six periods a week (see Table 3.3), were chosen each year from the two cohorts targeted in the research and the subjects they taught at the School. Selected students ranged from high academic achievement, students in the mid range and students at the lower end of the academic spectrum, and were selected on their NAPLAN performance in all of the areas (reading, writing, language conventions, and numeracy). In relation to the specified bands within NAPLAN, participants from Cohort A were situated in bands three to eight and Cohort B were situated in bands four to nine to represent the three achievement groups. Participants were interviewed for approximately 30 to 60 minutes and interviews were audio recorded with prior cleared consent. Table 3.5 displays the total number of student, teacher and parent interviews for the study.

Table 3.5
Total Number of Interviews Conducted Over the Term of the Research

Participants	Inception*	First Year	Second Year	Third Year	**Total**
Cohort A student	10	10	10	10	**40**
Cohort B student	20	20	20	20	**80**
Cohort A teacher	2	2	3	8	**15**
Cohort B teacher	15	15	11	15	**56**
Leadership team	4	4	1	4	**13**
Parent focus group	0	1	1	1	**3**
Gaming forum#	0	0	0	5	**5**
Total interviews	**51**	**52**	**46**	**63**	**212**

Note. Inception* = Initial interviews that took place within the first three months of the implementation in the first year of the study. Gaming forum# =Five gaming forums conducted with 10 students from Cohort A and 20 students from Cohort B.

3.6.6 Observations

Rossman and Rallis (1998) suggest observations in natural settings can produce rich descriptive data through open ended narrative or through the use of published checklists or field guides. Through the course of the research non-participant observation took place and observations sought to not interfere with the participants in the activity.

Judson (2006) developed an observation measurement called Focus on Integrated Technology Classroom Observation Measurement (FIT:COM). This instrument has five constructs that were used to assess the ICT use within a classroom context. These included: Design of technology integration; class dynamics; meaning and purpose; content and knowledge; and, technology as tools. All five constructs contained five statements (25 statements in total), where a five-point scale was available for an observer to rate (0 = never occurred to 4 = occurred frequently). A maximum score of 20 was attainable for each of the five constructs, with an overall possible score of 100 for the observation instrument. An adapted version used by Bate (2010b) in his research into the study of "Beginning teachers' pedagogical identity and their use of ICT" was used to guide the observation process of this research (see Appendix K). Results from the observations were recorded on the template drawn from Bate's research. Observations were scheduled with teachers to minimise the impact on classes and took place in classrooms (typically between 30 and 45 minutes) at the School. The researcher with the assistance of an observation colleague were situated at the back of the classroom whilst instruction took place. Post instruction both observers moved around the classroom. Table 3.6 provides an overview of the total observations that occurred over the duration of the study.

Table 3.6
Total Number of Observations Conducted Over the Term of the Study

Year	Cohort A	Cohort B	**Total**
First	4	4	**8**
Second	4	8	**12**
Third	4	6	**10**
Total observations	**12**	**18**	**30**

Four observations were independently co-observed by an associate of the researcher in the first and third year of the study. This process helped to improve the general quality of the data collected using the FIT:COM observation protocol. In each of the four co-observed classes, variation in interpretation was minimal (3% and 2% in the first year, and 4% and 3% in the second year). The co-observed FIT:COM scores are shown in Table 3.7.

Table 3.7
Co-observation of Teacher Participants from Cohort A and Cohort B

First Year	Third Year	Researcher	Associate	Variation
C41		50	47	0.03
C42		53	55	0.02
	C31	48	44	0.04
	C37	63	66	0.03

Note. C41, C42, C31, C37 = Refers to the four teacher participants from the study that were co-observed.

Observers monitored movement around the classroom, communication between students, and classroom dynamics in relation to behaviour for the set period. During the observation cycle artifacts (e.g. lesson plans and assessment tasks) were collected to increase the understanding of the viewed lesson.

3.7 Data Analysis

Data from all of the collection methods were analysed and scrutinised for common themes. Key themes of student engagement in learning, student and teacher laptop use, teachers' ability to integrate ICT into the curriculum, teachers' pedagogy in the use of ICT, and learning impact helped to interpret the implementation of a 1:1 laptop program at the School. When analysing the qualitative data, the research adapted Miles and Huberman's (1994) method of data reduction, data display, and drawing and verifying conclusions. In analysing the quantitative data in the questionnaires, descriptive analysis and two-variable relationships (Punch, 2009) provided a starting point. Mean scores and the corresponding standard errors of the means were used to compare and contrast Cohort A and Cohort B and provide a summary of any relationships.

In addition to comparisons of mean response scores between the two Cohorts A and B, comparisons of mean scores between the First, Second and Third years, within a cohort, were also undertaken, so as to identify statistically significant changes in time. In the case of comparing only two mean values (e.g., Cohort A vs. Cohort B), the 'Independent Samples t-test' was applied. In the case of comparing three mean values (e.g., First Year, Second Year and Third Year), the 'One-Way ANOVA' test was applied. In Section 7.3, access to all of the individual data was not available, but only to summary data, (i.e., N, Mean, Standard Deviation). In this instance the 'One-Way ANOVA Test for Summary Data' (URL: http://danielsoper.com/statcalc3/) was used. This test may be applied to the comparison of two, three or more mean values. In the case of comparing two mean values it is equivalent to the Independent Samples t-Test. In all cases where a test indicated statistical significance, its level of significance was indicated as either $p < 0.05$ or $p < 0.01$. Both forms of data analysis were computer assisted with NVivo being used for qualitative data analysis and mainly SPSS for quantitative data analysis.

From a validity and trustworthiness perspective, mixed methods research enabled the researcher to draw meaningful and accurate conclusions from all the data in the study. The use of qualitative research was used to corroborate quantitative findings (Hammersley, 1996).

3.7.1 Quantitative data

The questionnaires were subject to Reliability Analysis and revealed values of Cronbach's Alpha (see Appendix H) for the distinct 'Themes' (constructs) that indicated satisfactory reliability.

As discussed in section 3.6.4.1 the final questionnaires contained 25 items for the students, 28 items for the teachers, and 19 items for the parents. All items with a Likert-type scale were calculated to determine a mean score as an overall index of the participants' response. The maximum possible mean score varied between 4.0 and 5.0 depending on the specific question as demonstrated in Appendices A, B and F. Mean scores and their corresponding standard error of mean were calculated for all participants who completed the questionnaires between the first year and third year of the study. These mean scores indicated the level of use of laptops. 'Independent Sample T-tests', (comparison of two mean values), and the similar 'One-Way ANOVA contrasts', (for comparison of three or more mean values) were used to determine whether certain differences between mean values were statistically significant at the $p < 0.05$ level or not.

3.7.2 Qualitative data

All interviews were audio recorded and transcribed into a word processing package. These transcriptions, together with the written responses were imported into the NVivo software. Data was coded into specific nodes at the conclusion of each of the data collection periods. Nodes were created with specific categories relating to student laptop use, teacher use of laptops for learning, impacts on learning and implementation differences between the two cohorts. Coding by the researcher followed the coding considerations identified by Lofland and Lofland (1995, p. 186) including: (1) Of what topic, unit, or aspect is this an instance? (2) What question about a topic does this item of data suggest? (3) What sort of answer to a question about a topic does this item of data suggest? Student, teacher, parent and leadership team transcripts were all coded by allotting portions of the data to one of the 351 branches within nine tree nodes.

3.7.3 Integrity of data analysis

Ackroyd and Hughes (1992) argue that whatever the stand on the issues involved in the research, the underlying point is that the research instruments and techniques used for collecting and creating data should be sensitive to the nature of the phenomena of the research. The following approaches demonstrate the integrity of the data analysis:

3.7.3.1 Auditability

All qualitative and quantitative data collected has an audit footprint, which enables it to be traced back to the source. All interviews were transcribed using 'Dragon Speech' recognition software and rightfully capture the response of the interviewees. All transcripts and audio files were tagged with an individual code enabling for rapid and easy retrieval. Questionnaire data were also tagged with a unique code ensuring the full identity of the response and details of time and location are distinguishable.

3.7.3.2 Member checks

Verifying data by the use of member checks is another useful way of improving credibility of the research (Guba & Lincoln, 1981). As each interview was audio recorded and subsequently transcribed, each participant was given a copy of the interview transcript. Participants were asked to read the transcript and provide feedback to validate the accuracy of the transcript. Prior to the commencement of the annual interview, all interview participants were given a copy of their previous interview as a Word document to prepare them for the ensuing interview.

3.7.3.3 Peer debriefing

Robson (1993) elicits the worth of having a colleague or other peers to expose the research and findings. Regular discussion with academic members of The University of Notre Dame Australia enabled the interpretation, analysis and conclusions to be examined on a continuous basis throughout the study. Peer debriefing helped minimise research bias and upheld data analysis integrity.

3.7.3.4 Triangulation

One of the main advantages of employing mixed methods is that it allows for triangulation through the use of multiple and different sources (Denzin, 1988). Firstly, the research used a variety of instruments (Punch, 2009) to verify the qualitative and quantitative data. Questionnaires (students, teachers, parents), interviews (student, teachers, parents and key leadership members) observations (students), parent and staff forums, and the collection of artifacts. Secondly, with a three year longitudinal focus, the collection, analysis and interpretation of the data added to the credibility of the research as a reliable understanding was based on evidence collected by repeatable procedures (Clark, 1983).Thirdly, qualitative data was coded and attributed to specific themes, which again occurred on an annual basis. This database of information was used to clarify any queries related to the research topic and more importantly helped reveal patterns or anomalies found in the interpretations. Finally, by comparing the data of the students, teachers and parents, it was possible for the study to examine the research questions from three angles, adding to the overall trustworthiness of the study (Barbour, 2001).

3.7.3.5 Acknowledgement of bias

The researcher was fully aware of the need to minimise any bias which accrued from his affiliation to the School (Freeman & Sherwood, 1970). As the researcher conducted the inquiry with his organisation, it was of the utmost importance to test for possible bias. To minimise the risk of bias, five colleagues critically evaluated the research questions, methodology and findings. These colleagues were two university lecturers in the Schools of Education and Medicine at The University of Notre Dame Australia, an independent researcher with research student experience, and two colleagues at the School with experience in leadership and ICT. These colleagues offered alternative explanations and suggestions for the data collection which in turn strengthened the validity of the research (Yin, 2009).

3.8 Limitations of the Research

This research had a specific focus on 1:1 laptop programs and boys' education. Since this research conducted was with a sample of boys only and teachers and parents from one school for boys, it is acknowledged that it is a small representation of all the boys' schools that exist locally, nationally or globally. Conversely, the high response rate of participants and the diversity of the sample suggests possible advantages with the provision of a suitable data set about junior and middle school experiences about laptop use. Although, due to the size of the study, interpretations of the data and subsequently the findings compared to other 1:1 laptop research should be undertaken with caution.

Some of the other limitations to be considered may be researcher bias, as the study was conducted by one researcher about the implementation of a 1:1 laptop program in a single gender school. It is acknowledged that the time relevance of the study could be considered as a short timeframe to fully evaluate the effectiveness of such implementations. Secondly the study pre-dated moves towards Bring Your Own Device (BYOD) in schools. It had a focus on an Apple MacBook product with no other comparative computer or mobile devices used. Thirdly, there was a variability of teachers' skills with the use of ICT and more specifically how laptops were used for learning. Therefore, another possible limitation was how teachers' ICT skills might contribute to a poor implementation. Finally, 1:1 laptops have been overtaken by other mobile technologies and implementation approaches (e.g., BYOD). This could be considered as a possible limitation in that the research pre-dated newer technologies and approaches.

As discussed earlier to minimise these limitations, the research applied both qualitative and quantitative techniques. This approach allowed the study to answer the research questions not essentially answerable by either a qualitative or quantitative approach, but rather bringing together the strengths of the two methods (Creswell & Clark, 2007).

3.9 Role of the Researcher

The researcher was known to the sample group due to the leadership position held at the case study school, a leadership position of responsibility within the junior school. However, the researcher was relatively unknown with the middle school sample as a large proportion of the group (58.8%) were new to the School. The researcher did not have a classroom teaching position and did not have daily contact with the participants, due to the nature of the size of the sample for both cohorts. Relationships with the research participants formed over the three years of the study, and this helped in developing an understanding of the research routines that were carried out each year; these being questionnaires, interviews, observations and focus groups. The following strategies were used to limit researcher bias: frequent debriefing sessions took place between the researcher and supervisors; peer scrutiny of the research project; the use of standardised measures such as NAPLAN; co-observations took place and results were compared; and another university academic collected data from participants. One of the prime counters to the risk of bias was frequent recourse to the published literature, which encompassed a wide range of perspectives and contexts. All these strategies enabled regular triangulation of the data.

3.10 Ethical Considerations

The research remained consistent with expected standards of professional conduct in accordance with the guidelines of The University of Notre Dame Australia. To abide by these standards, the following specific procedures were put in place:

3.10.1 Human research ethics

The University of Notre Dame Australia's Human Research Ethics Committee approved ethical clearance for this research in October 2009. Written approval was also obtained from the Executive Director of Edmund Rice Education Australia, the Executive Director of Catholic Education in the Archdiocese of Perth and the Headmaster of the School.

3.10.2 Special consideration for participants

Participants were given the utmost respect in relation to anonymity, privacy and confidentiality throughout the research and post-research. At the study commencement, each participant was provided with documentation explaining the study's research procedures and a guarantee for information confidentiality. All personal information was separated from responses and pseudonyms given to participants. In reference to safe keeping, Holmes (2004, p. 349) gives four crucial steps all of which were followed:

- participant names, addresses and letter correspondence were not stored on hard drives;
- identifier codes used on data files and the list of participants together with their identifier codes were stored separately in a locked cabinet;
- transcripts did not include participant names; and
- copies of transcripts in a locked cabinet kept in the School administration office. Electronic and hard copy formats have also been securely stored in the university supervisor's office and will be available for a five-year period.

These steps were followed and clearly articulated to the participants to reinforce the research had a high regard for confidentiality and data protection, and is deemed of utmost importance.

3.10.3 Informed consent

All participants were given a form notifying them their participation was voluntary, in answering questions they were offered a choice to refuse. Participants were able to withdraw from an interview at any time and could withdraw their data within a one-week timeframe of a particular interview. Participants were required prior to the research to complete the consent forms given. Parents acted on behalf of all students, as they were children under the age of legal consent. Consent forms were completed and returned at the laptop deployment in the beginning of the 1:1 initiative in the first year by the parents of the students. All parents and teachers were given participant information and consent forms to participate in the study.

3.10.4 Research responsibility

The researcher understood the ethical requirement to provide information to all participants regarding the research and the roles of all participants. Fundamentally, "no participant will be harmed in any way, real or possible. Respect and concern for the researcher integrity and for the participants dignity and welfare are the bottom lines of ethical research" (Gay & Airasian, 2003). Results from the research were presented to the participants in a range of forums across the research.

3.10.5 Dependent relationships

The researcher was known to the participants due to his positions he held as Head of the Junior School and as Acting-Deputy Headmaster. Steps to minimise dependent relationships between students, teachers and parents included:

- having another researcher not known to the group conduct interviews with teachers known to the researcher;
- involving another colleague in the student and parent forums; and
- using a colleague in lesson observations.

3.11 Summary

This chapter has detailed the pragmatic paradigm and mixed methods approach underpinning this research. As described in the explanatory approach, data collection was then followed by analysis. This enabled the research to build on existing understanding and contribute new knowledge through the elaboration of credible principles in the key issues, methods and process of social science.

Chapter Three has explained how this research was conducted and determines the effects on boys' education with the implementation of a 1:1 laptop program. It has extrapolated the longitudinal research design and the mixed methods approach engaged to collect and analyse data. It has covered the specific areas of the role of the researcher, the limitations of the research and the various ethical considerations. Chapter Four will focus on the findings that have been generated from this research.

CHAPTER 4.
Findings: Teacher Experiences

4.1 Introduction

Chapters Four, Five, Six and Seven of the thesis present the findings of the research. The organising schema for the research findings is shown as Figure 4.1.

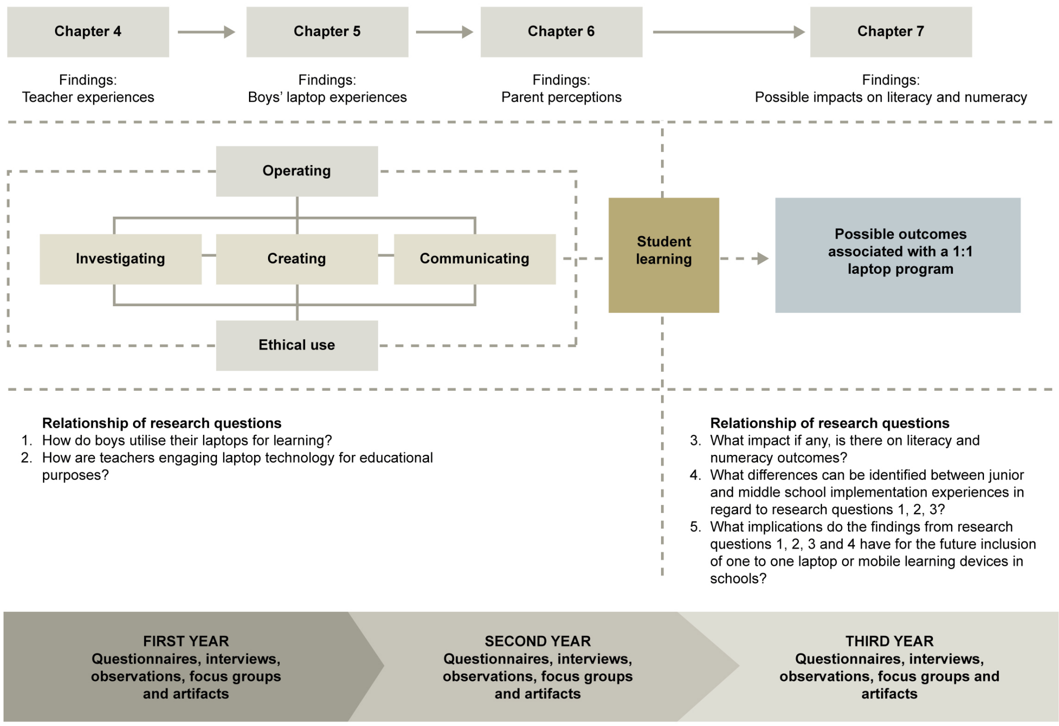


***Figure 4.1.* Organising schema for the research findings.**

The research adopted the five organising elements of the ICT capability learning continuum (ACARA, 2010a) – Investigating with ICT, Creating with ICT, Communicating with ICT, Managing and operating with ICT, and applying social and ethical protocols and practices when using ICT. These organising elements provided a foundation for understanding how teachers used ICT for teaching and students used ICT for learning. The research was also interested in the broader socio-cultural context of the school and frames its findings on outcomes within a holistic framework. This included students, teachers, parents and school leaders from the School. Figure 4.1 presents an organising schema for the research findings.

This chapter provides longitudinal data collected over a three year time frame enabling the researcher to discuss the teacher participants' use of ICT along with their viewpoints of the implementation of the 1:1 laptop program. Discussion focuses on results from the analysis of quantitative data and is further supported by analysis of qualitative data. Chapter Five lays out how and what the student participants used their laptops for in their learning and also considers their own personal views about the 1:1 laptop program. Chapter Six includes the parent perceptions of the 1:1 laptop program as these findings particularly inform research questions one and four. Chapter Seven articulates the possible impacts on literacy and numeracy outcomes.

4.2 Teacher Background

Data were collected annually for the three years of the study to establish the teachers' years of experience at the School (see Table 4.1). A weighted mean of 4.6 years was recorded for participants who completed the questionnaire. This weighted mean indicates a higher proportion of experienced staff in the upper bands of experience across both the junior and middle school. At the conclusion of the study in the third (2012), the School had 106 Full Time Equivalent (FTE) teaching staff, with an average age of 42.8 years. The average age for the teachers involved in the study was 46.2 years as shown in Figure 4.2.

Table 4.1
Percentage of Teacher Participants Teaching Experience in Years

Year (2010 – 2012)	Number of Years			
	0	1 or 2	3 or 4	≥ 5
	%	**%**	**%**	**%**
First Year (n = 39)	2.6	2.6	5.1	89.7
Second Year (n = 47)	4.3	4.3	6.4	85.1
Third Year (n = 52)	1.9	3.8	11.5	90.4

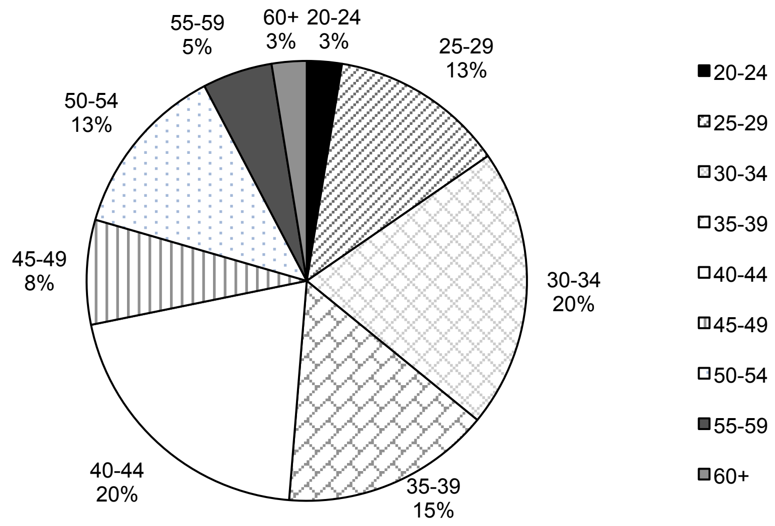


Figure 4.2. **Percentage of teacher participant age range (Third Year).**

A higher proportion of male rather than female teachers took part in the research, in both the annual interviews and questionnaire surveys. The School has a higher proportion of male staff, with a gender ratio of two male: one female. The proportion of male to female participants who took part in the study, in interviews and questionnaires are compared to the total teaching staff population in Figure 4.3.

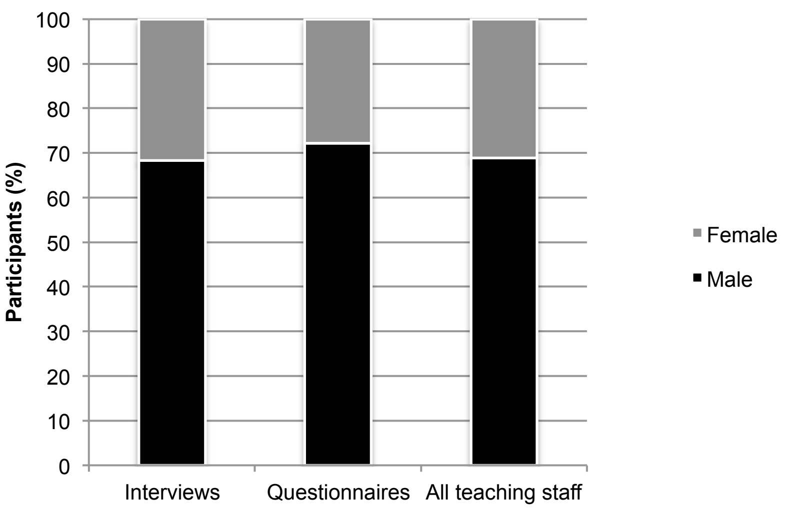


Figure 4.3. **Gender distribution of teacher participants.**

The inception teacher questionnaire (see Appendix G) was analysed to determine computer use by teachers prior to the commencement of the 1:1 laptop program. At that time, the School on average had five desktop computers per classroom, with computer laboratories located across the School campus, and individual laptops for staff provided since 2000. Teaching staff were expected to use their laptops for a range of purposes, such as maintaining attendance records and reporting, communication, and teaching. The inception teacher questionnaire (n = 39) consisted of 50 items seeking to gain an understanding of the teachers' use of ICT prior to the 1:1 laptop implementation. Item Six asked teachers to: 'Indicate how often you have used each of the following strategies over the last 12 months?' These were in the form of 10 Likert items, part of a Likert-type scale: *Often*, *sometimes*, *rarely* and *never*. The following statistics provide an interesting insight into the ICT habits of teachers before the 1:1 laptop implementation. Items two (b) revealed 59.0% of students used a computer in the classroom either *often* or *sometimes*, (e) nearly two thirds of students (64.1%) were either *rarely* or *never* rostered onto a computer and (i) most students *rarely* or *never* have a computer in the classroom (69.2%).

In response to Item Nine, 92.3% of teachers responded that they would like to make more use of computers with their students. When asked in Item Eleven: 'How often have you used computers with students?' 35.9% of teachers indicated using computers *daily*. In response to Item 12: 'How often have you used computers to support group work?' 53.8% of teachers indicated they used computers *rarely* to support group work. According to Item 15, 53.8% of teachers thought that, computers provide a set of technologies to support learning processes. Item 17 required teachers' to respond to a Likert-type scale about 'students engaging in a set of learning activities that involve the use of a computer' (see Table 4.2). Teachers either *strongly agreed* or *agreed* that computers could, 'help students think in different and more interesting ways' (92.3%) and 'motivate students to enjoy learning' (92.3%).

Table 4.2
Teacher Participants Responses to Views About Students Engaging in Learning With a Computer

Views about learning with computer	Strongly agree %	Agree %	Disagree %	Strongly disagree %
Lead to a better understanding of curriculum content	23.1	61.5	15.4	0.0
Help students think in different and more interesting ways	35.9	56.4	7.7	0.0
Be a faster way of learning	20.5	56.4	23.1	0.0
Lead to students helping each other	17.9	61.5	20.5	0.0
Lead to a better use of teacher's time	15.4	56.4	28.2	0.0
Lead to students completing more work	15.4	53.8	30.8	0.0
Motivate students to enjoy learning	64.1	28.2	7.7	0.0

Item 20 asked teachers: 'What types of learning activities have you used computers for with students over the previous 12 months?' The types of computer use which were used *often* were: word processing (64.1%), present information (66.7%), access information (82.1%) and to store information (64.1%) as shown in Table 4.3.

Table 4.3
Types of Learning Activities Teacher Participants had Used Computers for With Students

Types of computer use	Often %	Sometimes %	Rarely %	Never %
Show a concept	35.9	41.0	7.7	15.4
Make a product	25.6	33.3	23.2	17.9
Provide a problem	20.5	41.1	20.5	17.9
Store information	64.1	28.2	2.6	5.1
Access information (e.g. Internet)	82.1	15.4	0.0	2.5
Simulate an environment or an action	25.6	41.0	23.1	10.3
Analyse information (e.g. statistics, graphs)	25.6	41.0	23.1	10.3
Develop a skill (e.g. typing tables)	35.9	35.9	20.5	7.7
Present information (e.g. publishing, PowerPoint)	66.7	28.2	2.5	2.6
Word processing	64.1	28.2	2.6	5.1

Item 22 asked: “Do you think that computers can be used to improve student learning with your classes?” Teachers (92.3%) believed that computers could improve student learning. Item 35 questioned teachers’ own skills, knowledge and use of computers. A higher percentage of teachers believed they were intermediate users (61.5%), one third (33.3%) experienced users and the remaining minority (5.1%) novice users. Item 36 asked: ‘How do you feel when you support your students in using computers?’ Using a Likert-type scale: *comfortable*, *confident*, *excited*, *proud*, *unsure* or *nervous*, the majority (76.9%) of teachers could be said to feel *comfortable* in supporting students with the use of computers.

In summary teachers had an intermediate level of knowledge and use of computers, sought greater access to computers and believed that computers could be used to improve student learning. Teachers wanted to make more use of computers for learning and were predominately using ICT for word processing and accessing the Internet.

4.2.1 Qualitative aspects of the questionnaire

The annual questionnaire encouraged teachers to provide open-ended responses to Items One to Nine, 13 to 15, 17, 19, 26, and a final overall comment about the laptop program. These open ended questions enabled the participants to provide written responses about their own understanding(s) of the laptop program, and at the same time articulate their pedagogical knowledge, beliefs and understandings. Quotations use the letter A or B to indicate Cohort A or Cohort B, whereas the letter C refers to a class teacher. A number that identifies the student or teacher participant follows these letters. The last four digits indicate the year of the interview.

With reference to teacher experiences, the question was asked: (1) “How do you use laptops to support student learning?” Fourteen teacher participants expressed a view similar to Teacher Participant 60:

> Mainly I try and use it as a support in terms of their learning. I try not to have it as the main focus and as something to supplement, to help with their learning. (C602012)

This quotation indicates that this classroom teacher in 2012 (Third year of the study) felt that when using technology in the classroom, it needed to be teacher guided and have a clear purpose. This comment raises questions around the teacher's role in terms of direction and guidance within the learning process. The importance of guidance by the teacher in both primary and secondary schools is paramount when considering the educational impact a lesson or experience may have on a student (Hattie, 2009).

4.2.2 Teacher support: Professional development

Teaching and learning communities do not form without guidance and support required to sustain the community (Burns, 2008; Dewey, 1943; Voulalas & Sharpe, 2005). The setting of the community that is the subject of research encompasses students, teachers, school leaders and parents who coexist for a shared common goal: improved education. A holistic approach to professional development is integral to the development of teacher participants, with the focus on pedagogy (Cardno, 2005). The literature also suggested (Fullan, 2001, 2008; Hargreaves, 1999; Rablin, 2006) that the provision of adequate and specific professional development is important.

Data were collected in quantitative and qualitative formats to determine teacher participants' views about support in professional development. As discussed in Chapter Three, Item 27 was added to the annual questionnaire in the second year to allow further input into the area of professional development. Teacher participants responded to the Likert-type options: *strongly agree, agree, don't know, disagree, strongly disagree,* for Item 27 (e): 'The amount of ICT professional development has been adequate.' Figure 4.4 shows the annual percentages for these five options. Data displayed an increase of 21.8 percentage points from the second year (34.0%) to the third year (55.8%) in the amount of professional development considered *adequate*. The options of *disagree* decreased by 11.6 percentage points in the second year (40.4%) to the third year (28.8%). It appeared that professional development began to improve gradually for teachers.

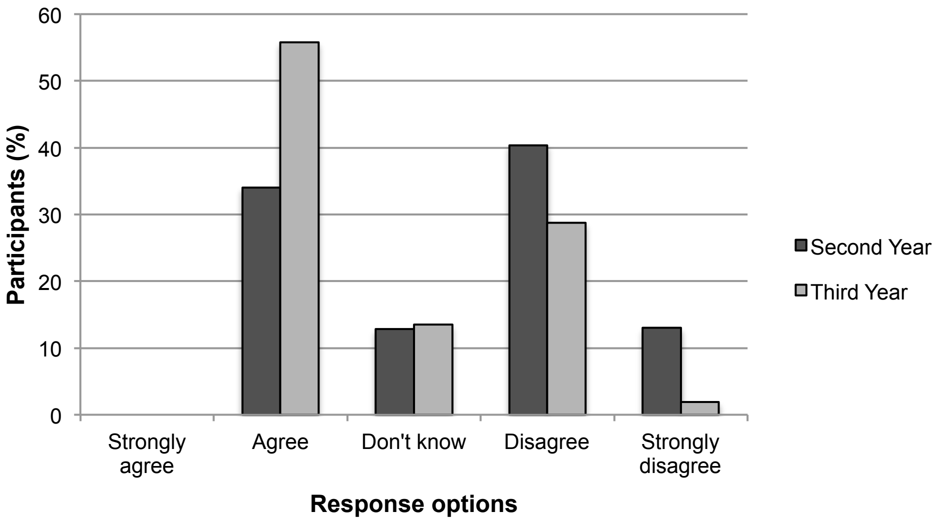


Figure 4.4. **Extent to which teacher participants agreed or disagreed to: 'The amount of professional development has been adequate.'**

Similarly with the qualitative data, eight teachers expressed the view that professional development had continued to improve over time. The following examples also include a response from a leader at the School:

> Yes, I think it is getting better, yes, I do. I think it is definitely better from 12 months ago. (CL472010) [Case study school leader]
>
> No, I think it has been very positive. I think there is a lot of PD. It is good to get a grounding on things like the portal and other ICT areas. (C552012)
>
> Yes, we have had a lot of PD from Charles [pseudonym] on development of specific programs such as, you know, the portal, ways of monitoring students in class. I think that has been ongoing, I think that has been very strong at the school for the last few years. (C552012)

There was a reference by a teacher and a leader about the importance of formalising the professional development program at the School. Both of these participants proposed that an accreditation method or linking to the performance management of teachers would encourage, or rather direct, the staff to essential components of learning for professional development:

> I think what you hear is a lot of scuttlebutt about not being supported but then when you offer it without some sort of formal schedule, people will not turn up. You can always invent an excuse not to turn up, but if you are required to be there that is a different matter. So I think it should be formal. People will say, 'Look, what we need is to have a pupil free day and just do that,' but I think research shows that it does not

> work. People will forget it very quickly. What you need is a regular thing, so yes, you are required to be at school at 7:30 am or whatever and just get it done. (C542012)

> The strategic direction of the school, the infrastructure that we put in place, the PD that we do for staff. I think the PD we do for staff is really important, and the way in which we can continue to link that to the performance management, so staff are aware that, they have to, you know, whether it is walk around the classroom, whether it is constantly looking at students, whether it is having those conversations with kids about what they are doing, where they are going and what is expected of them. And I think that is again a whole school approach, which must be filtered down to each one of the classrooms. (CL462012)

A whole school approach for professional development emerged as a theme for improving teaching and learning with the use of ICT. The notion of professional development being targeted and relative to the needs of all teachers was viewed by the School leadership team as crucial.

4.3 Teacher Attitudes and Beliefs

This section presents the attitudes and beliefs of teachers in a range of areas: engaging students, physical and learning difficulties, tailoring learning, scaffolding learning, the promotion of active and authentic learning, learner independence and the role of a teacher.

4.3.1 Engaging students by motivation and challenge

Item three required teacher participants to indicate how often laptops were used to engage students by motivation and challenge. A shift towards lower scores over time was noted, although it was not statistically significant. It seems that, towards the end of the research, teachers no longer had a strong reliance on the laptop, and the students no longer saw the laptop as vital in terms of keeping them engaged. In Figure 4.5, and in the many figures of similar format that follow this study, the mean value is generally presented as a coloured symbol, and its corresponding 95% Confidence Interval (CI) is denoted as uncertainty bars.

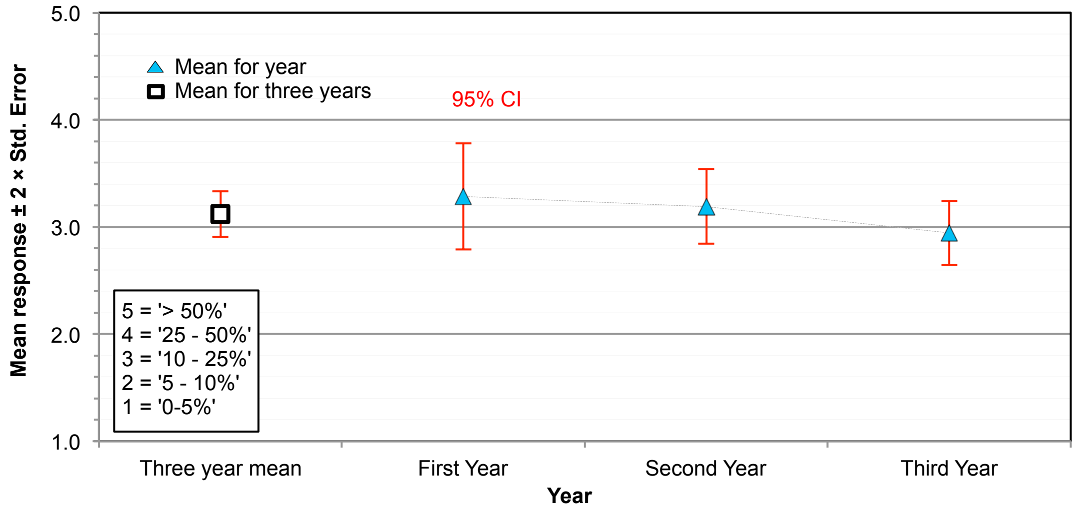


***Figure 4.5.* Mean responses of teachers estimating the percentage of time laptops were used to engage students by motivation and challenge.**

These results could indicate that the laptops had become embedded into the fabric of the school, and could also imply that the novelty factor of the device had waned over time. Teachers expressed this sentiment over the course of the study, as the laptop program had become the 'norm' of the day-to-day teaching and learning experience:

> I think they have gone down. Not to ... they have not bottomed out. There was all this excitement about having this laptop. Well, now it is just this thing they carry around. So they like having it, they want to have it, but it is like any kid with a new toy – they love it and then the shine disappears and it is this thing. They would be lost without it, so the motivation has not gone back to normal but it is certainly not as high as it used to be. (C622012)

This decrease in the use of the laptop to motivate and challenge students does offer a different perspective to the literature, which suggests that laptops or mobile devices increase learner engagement (Keengwe et al., 2012; Mouza, 2008; Swan, Van 't Hooft, Kratcoski, & Unger, 2005). Chapter Seven discusses learner engagement in further detail.

4.3.2 Overcoming physical or learning difficulties

Item Nine required the teachers to indicate how often laptops were used to overcome physical disabilities or other (e.g. learning difficulties). The three year mean of 1.8, shown in Figure 4.6 suggests that the laptops were rarely used for this purpose, and the change from first year to third year was statistically significant (One-Way ANOVA, $p < 0.05$).

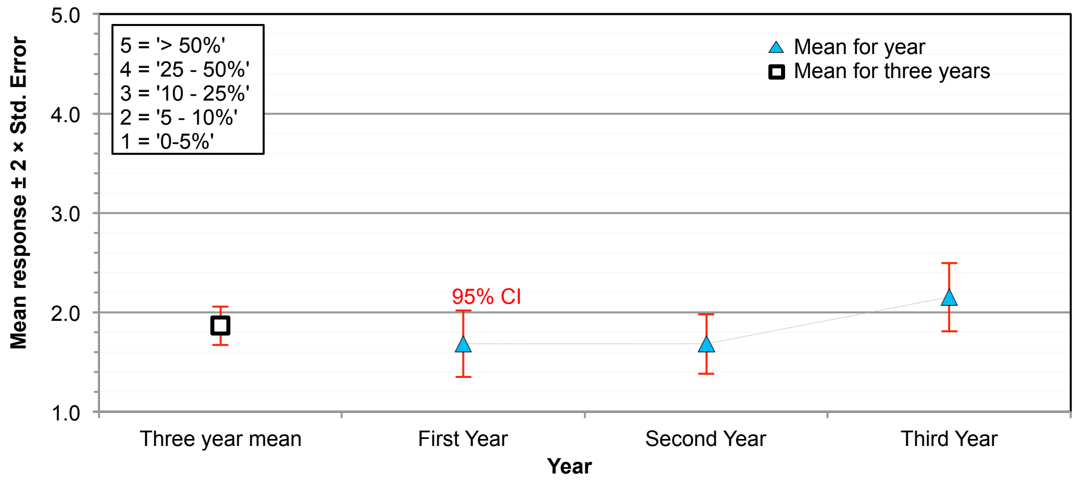


***Figure 4.6.* Mean responses of teachers estimating the percentage of time laptops were used to overcome physical disabilities or other (e.g., learning disabilities).**

While the quantitative data indicated that the laptops were not used for this item, the qualitative data suggests otherwise. Question One of the annual interviews asked: "How do you use laptops to support student learning?" Eleven teachers made reference to underutilised laptops at times in the area of learning disabilities; however, they were finding ways to use laptops for learning support:

> Text edit help used by boys with dyslexia or dyspraxia on occasion. This is a choice they have. Two boys are now 'typing up' in class tasks and examinations in Year Ten. (C952012)

> I have got two year seven classes, one class is really quite strong but the other one is full of IEP [Individual Education Plan] students so for them, they are very engaged on the laptop level, for them writing projects are very hard but when there is something that's correcting their spelling they feel like they've achieved something. Whilst it is not the highest marks they will ever get, you know, compared to others, they do get it in on time. And it's usually to some relatively good standard. Sometimes you have got to take it back and say, 'tweak it a little bit.' (C342012)

There was no mention in the qualitative data of laptops being used to help students with physical disabilities at the School.

4.3.3 Tailor learning or develop individualised learning pathways

Item Eight required teachers to respond how often teacher participants were using laptops to tailor learning or develop individualised learning pathways. When examining Figure 4.7 it suggests the use of the laptop to ‘tailor learning or develop individualised learning pathways’ was concentrated between the 5-10% and 10-25% percentile options, with an overall three year mean score of 2.4. These results would suggest teachers were using the laptops in a minimal capacity to tailor or differentiate learning.

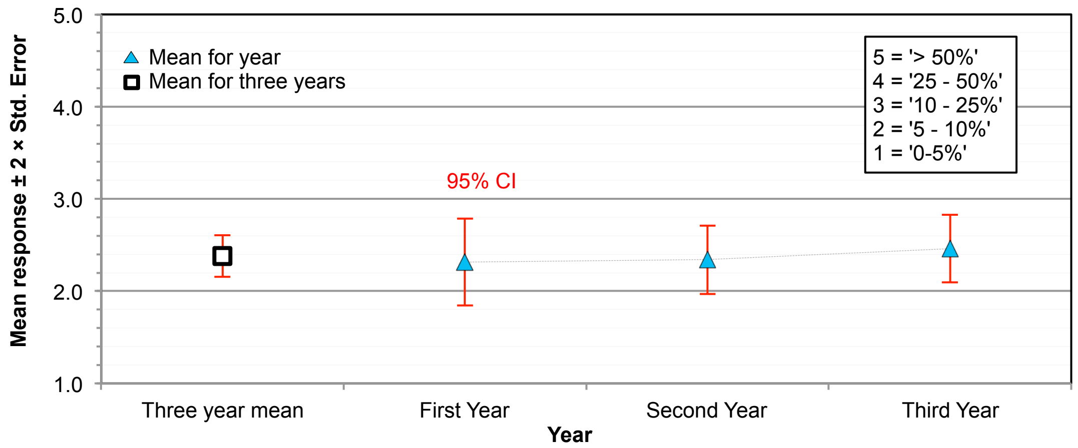


Figure 4.7. **Mean responses of teachers estimating the percentage of teaching time laptops were used to tailor learning to the learner or develop individualised learning pathways.**

However, a different view emerged when teachers at the annual interviews were asked about their use of laptops to support learning. Twenty-eight teachers mentioned how they had used the laptops to tailor learning or provide a differentiated curriculum with the use of the laptops. For example:

> I think that’s part of the best thing about the laptops is that it allows, especially top end kids, to go off in different directions with their own learning and follow their own interests in an area. Going off in many different directions amongst different students, and that's the sort of thing, which I think makes the laptops brilliant. (C612011)
>
> This again is dependent on how well the teacher has differentiated his or her class. The laptop is merely a tool that both the teacher and the students can use. (C312012)

> This is an important use. By tailoring the task to suit individual learning styles and abilities, the computer has a lot of apps and programs that can be tapped into. (C762012)

> It means that the kids can work at their own pace and focus on challenging and extending themselves. Laptops are integral to doing that because if you use something like My Maths Online it's got a support built in there and then anything that they still do not get, they have got me to float around the help them with. (C652012)

These comments suggest that the teachers showed an understanding of the importance of differentiating and tailoring learning for their students. It also appeared that with the use of the laptops, teachers were inventive in providing a range of opportunities for differentiation.

4.3.4 Scaffolding to support higher order thinking

Item Five required teachers to indicate how often laptops were used for scaffolding to support higher order thinking. Figure 4.8 shows a steady decline, although not statistically significant, it could suggest that teachers did not value the laptop or ICT as a tool for scaffolding to support higher order thinking. Teachers may have the view they have a better capacity to cater for student needs in this area and be the bridge that extends their students' thinking.

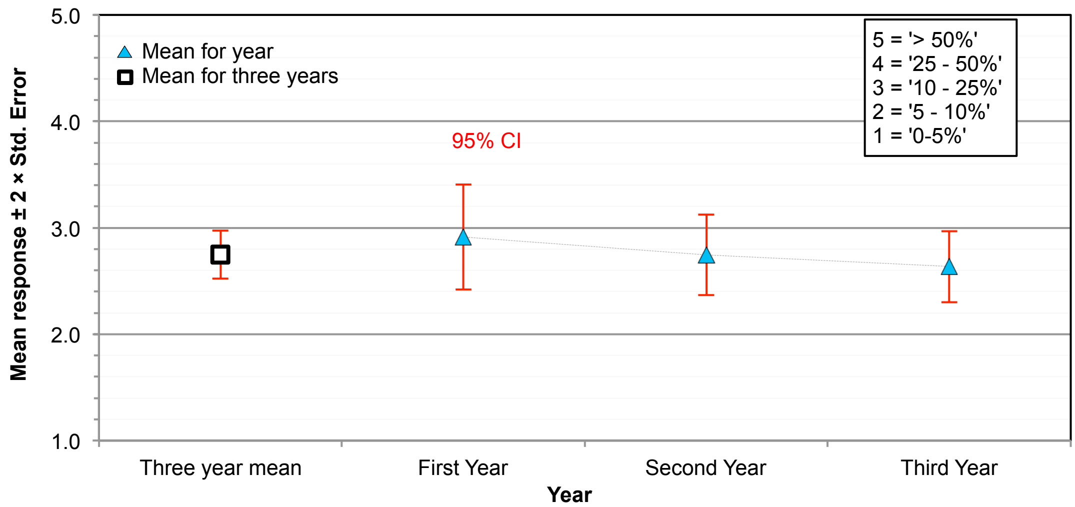


***Figure 4.8.* Mean responses of teachers estimating the percentage of teaching time laptops were used to provide scaffolding to support higher order thinking.**

Teachers mentioned that in providing support for the higher order tasks with the laptop there was an effort required to guide students. The effort was dependent on the structure of the planned lesson and their level of confidence in the use of the laptops. Ertmer (2005) suggested that if teachers are more confident in using ICT, higher level use is more probable. There was a recognition that more of a focus on higher order thinking needed to be incorporated into their lesson structure:

> Yes, it requires more teacher effort as well to guide them through. So, unless I guess the teacher is willing to try and push that element, yeah, you know, it can be a difficult process, but I, you know, try and do it at all times. (C502010)

> I think when you are leading the higher order thinking, it generally comes down to how you structure it, lead them through the basic ideas and then get them to actually create something new out of what they have learnt. (C702011)

> I look at the end result in, say, Year 12, and in my area where a lot of that higher order thinking is required in history. For example, with the need to sort of ... that analysing and evaluating that is really a core part of it, and I find it is a weakness of the boys coming through so therefore I think we have ... With the laptops I think it is something we can use to try and implement that a little bit earlier, and I think we have actually started to do that. (C622012)

These beliefs are similar to the view of Reid (2002) on the merit of ICT use, as it has the potential to change the traditional way of teaching, but at the same time requires teachers to become more creative and readjust their teaching approaches and strategies. Teacher participant C37 [English Teacher] expressed the view that the ‘multi-modal’ nature of delivering information digitally to supplement and enhance discussion was important:

> With more multi-modal experiences for them to move away from writing or reading being just very one dimensional to being more realistic to the way they experience it outside of school. (C372011)

This multi-modal experience commonly resulted in more diverse and deeper questioning, which in turn made the lesson more appealing for students. Students responded to the wide-ranging nature of information, and showed evidence of thinking more independently and critically.

4.3.5 Promoting active learning and authentic assessment

The principle of active learning and authentic learning assessment involves challenging students with a range of real world scenarios (Carter, 2013). Item Two required teachers to indicate how often laptops were used to promote active learning and authentic assessment. Figure 4.9 shows an overall three year mean of 3.0 ± 0.2, indicating teachers tended towards the 10-25% percentile option.

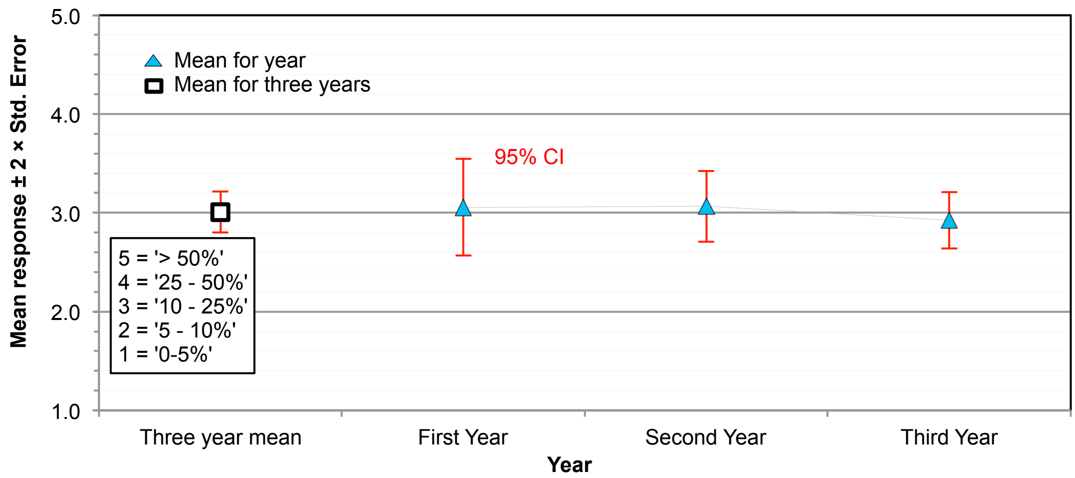


Figure 4.9. **Mean responses of teachers estimating the percentage of time laptops were used to promote active learning and authentic assessment.**

During interviews, seven teachers mentioned examples of challenging their students with real world problems. The laptop was referred to as a 'powerful tool' enabling students to connect to a range of real world scenarios:

> I like to look at it in terms of their transformational learning, and also the engagement. I've found because, in the United Nations, I will use it again next year, it's a really powerful tool, because it taps into the emotional intelligence for the kids. I've included things like Caritas videos and those sorts of things as well, to get them to really look at what people are doing to try and make a difference in the world with all of those particular things, like poverty and infant mortality and HIV and those things. So we've taken a real world problem, and the Caritas videos which ties in with World Vision and the project compassion and those things that we do in service learning, has been quite powerful for them as well. (C382010)

This form of learning and assessment is well described by the word 'active' and could promote the view of Petrass (2008) who suggested that, the learner takes a dynamic and energetic role in his or her own education.

4.3.6 Increasing learner independence

Item Six of the questionnaire asked teachers to indicate how often laptops were used to increase learner independence. The results showed a three year mean score of 3.3 ± 0.2, placing teachers mainly between the 10% - 50% percentile options (see Figure 4.10).

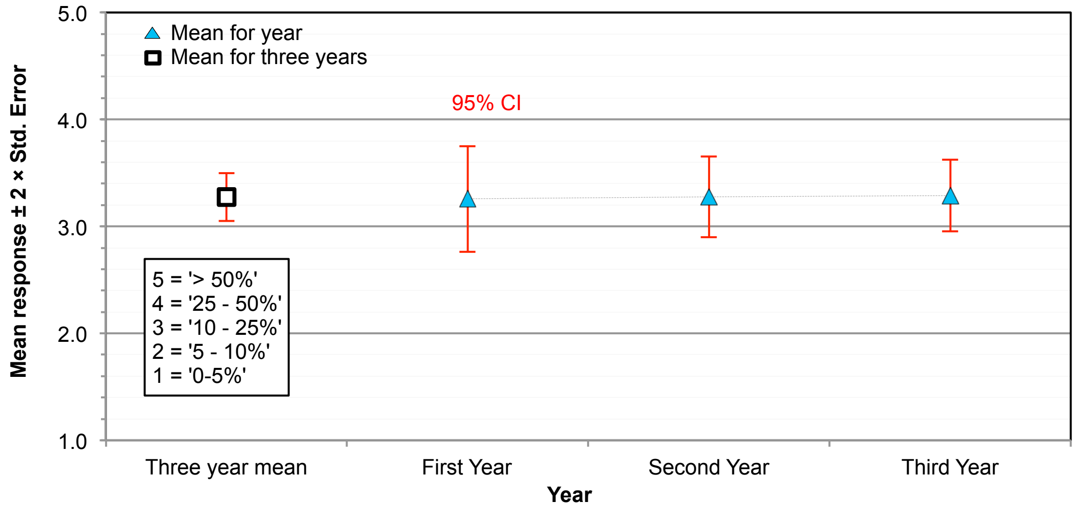


Figure 4.10. **Mean responses of teachers estimating the percentage of time laptops were used to increase learner independence.**

Teachers shared a view of the value of independent learning in response to Question Five of the annual interviews: "How do you use ICT in the broader context of education?" Teachers considered that it was important for them to prepare and provide their students with opportunities to develop as independent learners:

> Well, I guess they become, obviously, they become better independent learners, that's for sure. I certainly find that as a teacher it's certainly my role to introduce students, whether it's to a website or to a piece of software and demonstrate the basics to them and then within 48 hours they're showing me how to do things and I think that's fantastic. (C522010)

> I think really what we're doing, and even this is before the use of the ICT, I think it's just one of the important roles we have is preparing them for life after school, and their ability to become self-learners, independent learners. See, one of the wonderful things I think about the laptops and the use of the computers is that what it does enable us to do now is to very clearly give them the skills to be able to find out just about anything they want to once they left school and they're not being directed by anyone, they're not being supervised and they can actually go and find out whatever they need to. (C602012)

Teachers discerned less peer-to-peer communicative interaction in the classroom. The following comments indicate that laptops had created an environment where students were focussed on independent learning, rather than discussion:

> The social aspect of boys now, of the students has definitely changed. I don't want to say they're hiding behind the machines but their ability to socialise has definitely decreased. I have found. Their ability to actually be, you know, to verbalise stuff, it

> has definitely come down. I've seen it over the last three years myself, and I think that's somewhere they need, that's why we do a lot of public speaking, we do a lot of presentations and we do a lot of group work, well, I do anyway because, you know, I still want them to get that talking amongst themselves rather than just sitting behind a laptop. (C692011)

> I think the interaction is less, yeah, I think the discussion, conversation between them is perhaps less, unless it is encouraged and explicitly said, 'Look, make sure you're talking and discussing things.' (C432012)

These comments would suggest that possibly at the expense of more cooperative social behaviour in the classroom, teachers were using laptops to increase learner independence.

4.3.7 Teacher communication as a facilitator

Question eight of the annual interviews asked: "What do you see as your main role(s) when using laptops with your classes?" A total of 37 teachers responded with 46 types of responses over the three years. Using the coding considerations as identified by Lofland and Lofland (1995, p. 186), and described further in the Methodology chapter, the responses were narrowed to five categories. These being: facilitating, teaching skills, guiding/mentoring, engaging, and trouble shooting Figure 4.11 presents the distribution of the teacher participant role responses.

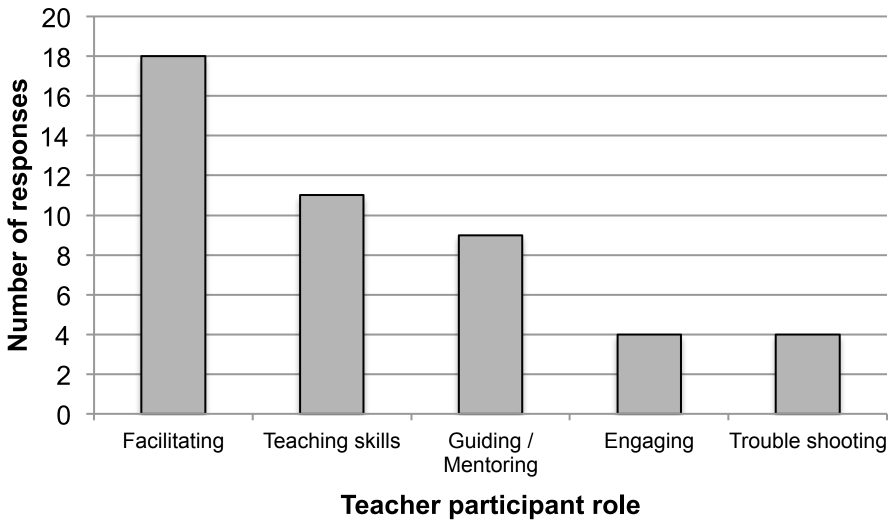


Figure 4.11. **Teacher participants' responses describing their roles as a teacher.**

Of the 37 teachers, most (16) described their role could be best described as a facilitator. Another eight felt that they were there to teach skills, with the remaining 13 stating that they were there to guide/mentor, engage, and trouble shoot for the students:

> I think a facilitator. I think it's more being there and making sure that they're on track, like a facilitator would mainly in a meeting, make sure that everyone's on track and that it runs on time. But, I think also just making sure everyone's okay. (C352010)

> I generally do a brief overview to start with and then I'm more a facilitator to them engaging themselves and I just go around one by one and assist the students. (C642011)

> Mainly as a ... what can I say? As a facilitator. More in terms of trying to answer questions about how they go about the process and clearing up if there's any misunderstandings about what the task is or what they have to do, that sort of thing. (C642011)

Teachers views remained consistent over the period of the study. They recognised that, with the introduction of a laptop program, their roles focused on making sure that they could guide their students and provide support to perform their desired lesson outcomes. This view is shared by Cheng (2001) who reports that the role of teaching is to facilitate support for students' learning.

The next five sections of the chapter will report on how teachers used laptops for learning within the ICT capability learning continuum. Each section is classified into the following five interrelated organising elements of the continuum: managing and operating with ICT, investigating with ICT, creating with ICT, communicating with ICT, and applying social and ethical protocols and practices when using ICT (ACARA, 2010a).

4.4 Managing and Operating ICT

The managing and operating requirements of using ICT within the 1:1 laptop School are now presented with examples of laptop use. The School could be defined as a highly ICT-resourced school from a hardware, technical and support perspective, in wake of the 'Digital Education Revolution' (DEEWR, 2009). However, this level of resourcing does not infer that the staff at this school are more inclined to work at a higher level in terms of their capacity to integrate ICT. Item 10 required teachers to choose descriptors that best described the way in which they used ICT (see Table 4.4). There were no reported cases of teachers responding to: 'I am aware that ICT can be used to support student learning but have not used it – perhaps avoiding it'. There was an increase of 15.6 percentage points between the first year (22.9%) and third year (38.5%) in teachers responses for: 'I think about the laptop as a tool to help me and am no longer concerned about it as a technology. I can use it in many applications and as an instructional aid.'

Table 4.4
Teacher Participants' Selection of Descriptions of the Way in Which they Use ICT

ICT descriptors	First Year (n = 35) %	Second Year (n = 47) %	Third Year (n = 52) %
I am aware that ICT can be used to support student learning but have not used it - perhaps avoiding it	0.0	0.0	0.0
I am currently trying to learn the basics. I am often frustrated using laptops. I lack confidence using laptops	2.9	2.1	0.0
I am beginning to understand the process of using ICT and can think of specific tasks in which it might be useful	5.7	10.6	5.8
I am gaining a sense of confidence in using the laptop for specific tasks. I am starting to feel comfortable using the laptop.	17.1	10.6	11.5
I think about the laptop as a tool to help me and am no longer concerned about it as a technology. I can use it in many applications and as an instructional aid.	22.9	34.0	38.5
I can apply what I know about ICT in the classroom. I am able to facilitate its use as a learning tool and integrate it into the curriculum	37.1	36.2	32.7
ICT has transformed the way in which I facilitate student learning	14.3	6.4	11.5

In summary, the data gathered indicates that the teachers were comfortable in using ICT and were making slight adjustments in the way they go about teaching each day with their developing skillset. The laptop environment and teacher skillsets are captured by the following comments made by teachers who take into account the use of ICT as a part of their pedagogical knowledge (Mishra & Koehler, 2006):

> Teachers need to be accepting that their role in the classroom has changed. Although, you know, there is some basic management skills that need to be adhered to regarding whatever activity you are doing in the classroom. I think teachers need to sort of let go a little bit of being that keeper of all knowledge, you do not necessarily need to do that, and the learning process can still be a success. (C522010)

> Our role and I think that does subtly start to change because now it becomes much more a question of okay, how do we facilitate them to be able to discern between what is truth and what is fiction, what is relevant, what is not relevant. (C602011)

> I think as a teacher it's very important to know, okay, what ... our job is to keep them engaged. If we teach in the way how we were taught back then that would never get the boys ... the students to be ... they will never engage and we will never get their attention. (C312012)

Teachers' managing and operating use of ICT, and specifically of laptops, need to be viewed realistically in terms of their own ICT skill set. This is similar to the view shared by Jordan (2011, p. 427):

> While learners are commonly represented as tech-savvy, and as expectant of using ICT in their learning, this is not the way teachers are usually represented. In the main, teachers are depicted as 'lagging behind', both in acquiring ICT skills and in using them in the classroom practice.

Teachers supported the view that they needed to develop their required knowledge and skills in ICT to enable a smooth integration of the laptop program in their teaching. The view was also noted in the literature of Wastiau et al. (2013). At the same time, there was also an understanding that it was hard for some teachers to change and embrace the use of the 1:1 laptop program:

> I think there are always people that are reluctant to change, because why change, we've done this for X amount of years. I tend to swing the other way and say, 'Well, is it the most effective way to do it, or is it just the fact that it's easier to do it this way?' And pretty much from the staff, you get some resistance, but I think they are going to be left behind, and actually they are going to put themselves behind the eight ball, because if they do not, it is either well, we would like you to come, but if you do not, you are going to be back here, the kids are going to be expecting here, and you are going to be delivering back where you are... (C352010)

Kennewell and Beauchamp (2003) suggested the pace of change for some teachers can vary depending on their degree of confidence and ability with the use of laptops for learning.

4.4.1 Personal use of laptops

Item 18 required teachers to best represent their laptop use from a selection of eight types of laptop uses as seen in Table 4.5. Results for Item 18 in the annual questionnaire indicated that the teachers engaged in the following activities on an everyday basis: email 99.0%, surfing the web 76.3%, and word processing and PowerPoint 81.4% (three year mean).

Table 4.5
Teacher Participants Three Year Mean Representing Laptop Use for the Eight Activities in Item 18

Types of laptop use	Everyday %	Two - three times a week %	Every two weeks %	Once a month %	Never %
Surfing the web	76.3	19.7	1.4	1.0	1.6
Email	99.0	0.0	0.0	0.0	1.0
Instant messaging/MSN	4.8	4.7	2.0	29.8	83.6
Webcam chatting	0.0	5.6	9.9	32.2	74.3
Social media	10.2	16.7	8.1	13.0	51.9
Watching/sharing information (e.g. YouTube)	8.2	40.7	25.3	15.7	10.1
Word processing/PowerPoint	81.4	14.0	1.6	1.3	1.7
Playing games	2.7	3.6	7.0	12.9	73.8

These activities can be best described as professional productivity (Johnson, 2012). However, of interest was the steady increase in the use of YouTube by teacher participants in the *everyday* option over the three year study (see Figure 4.12).

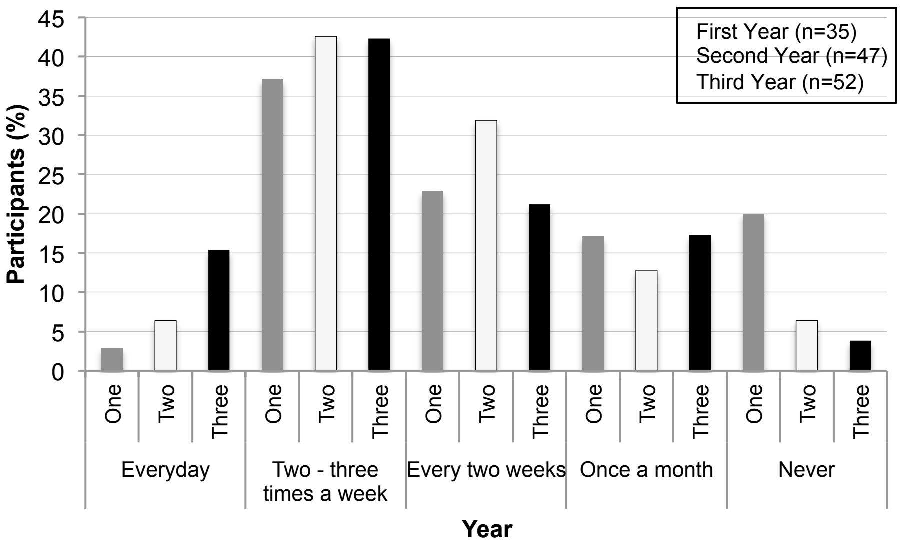


Figure 4.12. **Teacher participants reported use of YouTube from the first year to third year.**

In the first year for the *everyday* option, 2.9% of teachers indicated that they used YouTube; in the second year 6.4% did so, and in the third year 15.4%. Teachers indicated they saw a place for YouTube in education, and it was something they were more than comfortable in using to enhance their lesson:

> I feel more comfortable in using YouTube within my lesson. I spend some time prior to a lesson viewing the video and then use when it is required. An example of this for my English lesson is we watched the Sir Ken Robinson TED talks about education. This really helped in providing a starting point for our discussion about education. (C372012)

With the notion of 24/7 classrooms, the study was also interested in the detailed changes in the teachers' teaching capacity post-school hours. Teacher participant C59 indicated that the contact between the teacher and student had become more apparent. The use of a smartphone was an example of how technology had opened up the lines of communication between teacher and student. This view is consistent with Young's (2011) beliefs about teacher use of smartphones as part of learning.

> Absolutely. I get e-mails from children late at night that I can check on my iPhone, and like that little Kobe [Pseudonym] when he was having difficulties at home, the e-mail was a lifeline. (C592012)

This example of email interaction between student and teacher could be viewed as problematic. It asks the question why a student would be up late at night having to ask for help, and subsequently, is such late night interaction appropriate for both teachers and students. Notably, it highlights the ramifications for a contemporary 21st century teacher having to manage their workload. When to check and respond to emails due to the convenience of having multiple devices that are portable and easy to access becomes an issue for teachers. Therefore, finding a balance becomes important for teachers when they are away from the rigours of a school environment.

Item 20 required teachers to select the type of smartphone they owned. By the third year, the proportion of teachers who owned smartphones had grown from 44.7% to 57.7%, with only 25.0% of teachers (n = 52: total number in the third year) reporting not having a smartphone. Apple's iPhone was the most popular type of smartphone (with 57.5% of all respondents owning one), with the remaining 17.5% of smartphones shared by five other brands (HTC, LG, Nokia, Samsung and Sony Ericcson).

4.4.2 Tools to increase student productivity

Item Four required teachers to indicate how often laptops were used as tools to increase productivity. With a three year mean score of 3.2 ± 0.2 recorded, the data would suggest laptops were predominately used by teachers in the 10-25% percentile option (see Figure 4.13).

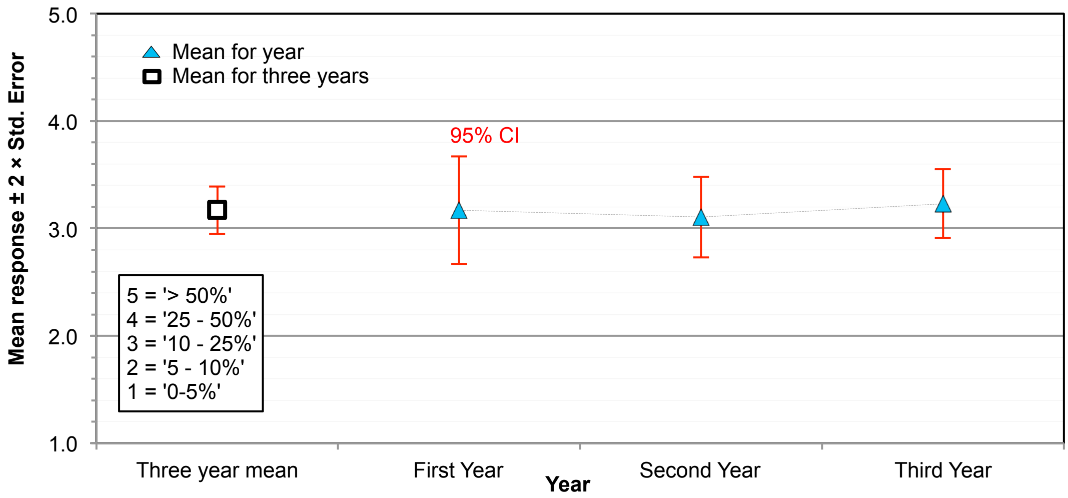


***Figure 4.13.* Mean responses of teachers estimating the percentage of time laptops were used to provide tools to increase student productivity.**

A theme that emerged in response to this item was the type of tools that enhanced student productivity. Seventeen teachers believed the laptop provided the students a range of tools to increase productivity with improved access to online content and programs, word processing, using spreadsheets for mathematics and helping to improve organisational skills. For example:

> They have much more access to things like dictionaries and thesaurus and programs that teach them grammar and spelling and all of those things. Where as previously they may have been reluctant to check. (C372010)

> Instead of the two or three pictures that typically may have been in a textbook, they are able to go into a lot deeper information by accessing online content available to them on the laptop. (C352010)

> So even things like collecting data, you can have a spreadsheet which has got, let's say it's got a formula in it which says ran between 1 and 6, so it's just generating the numbers on a die, and you do that in two columns and then you just simply drag it down, let's say, 200 times and then draw a graph. Now that process takes a minute. Now compare that to having two die in your hands and one kid rolling it and another kid recording it and then transcribing it to a table and then drawing up the histogram.

> That's two or three lessons work and it used to be, and at the end of it, the distribution looks the same, the educational value of that is the same but it's just that you're able to focus on then, okay, what happens if we extend that to three dice or four dice. You can not do that manually but you can do it very easily on a spreadsheet. (C542011)

> I also find it a very good way of organising boys in particular, so setting up folder systems where they can store documents easily. I find that having their textbooks in PDF on the laptops means they don't lose them, it doesn't get damaged, so there's two streams: one for enhancing learning but the other hand also keep them organised so that they spend more being productive on the learning task rather than trying to find things. (C622012)

These responses indicate that between the first year and the third year of the study teachers held the view laptops assisted students to increase productivity. Using laptops for learning provided options other than having to rely on visiting the library, using a calculator or pen and paper. Additionally, laptops enabled students to access electronic texts, which were more convenient than a textbook, possibly cheaper, included a search facility, and included interactive questions and exercises.

4.4.3 Teacher ICT skills and competencies

Item 16 of the annual questionnaire ascertained the teachers' skills and competencies in the use of ICT. It is known that knowledge of ICT is an important skill for teachers to have in the digital age (Krumsvik, 2008; Perrotta, 2013; Voogt et al., 2013). With this understanding it is vital for teachers to have a range of skills that help them be a part of this digital landscape (Wikan & Molster, 2011). For example, in the case of the item word processing, the instrument comprised multiple categories to display their abilities: cannot do much (*Limited*), and can format a document, change fonts, spell check, insert text, add footer and page numbers (*Basic*). Two further categories included: can insert images, create tables, change page setup, change margins (*Competent*), and use columns and sections, set up styles, use mail merge (*Advanced*). The purpose for using this scale was to help the teachers to consider their personal ability or range of capabilities in the *limited* to *advanced* options. The information provided by the teachers summarises their skillsets.

Figure 4.14 shows the percentage of teacher participants rating themselves in each of the 11 ICT use applications over the three years of the study. The most frequently reported uses of computers by students in published studies (Penuel, 2006) included: word processing, spreadsheets, PowerPoint/Keynote/presentations, email, computer file management, Internet, Web page authoring, digital photography, image editing, blogs and wikis, and video editing/podcasting/movie making.

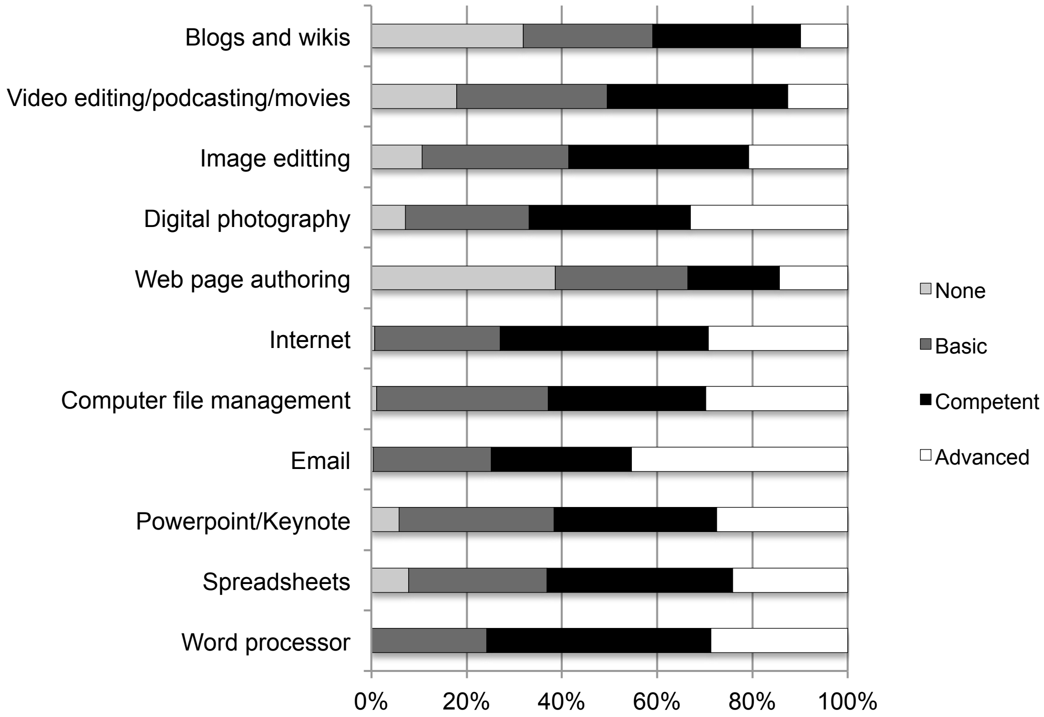


Figure 4.14. **Teacher participants self assessment of operational skills across 11 ICT applications.**

These 11 commonly used applications of ICT link to teaching and learning in schools. They were used at the School to gauge the skills that are required by a teacher. There is a view held that the lack of ICT-related knowledge of teachers can be an obstacle to the use of technology or the application of ICT skills (Pelgrum, 2002).

Teachers generally made a positive gradual progression over time, advancing across the options of: *limited, basic, competent* and *advanced* competency. Ten of the 11 applications experienced positive growth, especially the *advanced* option in the areas of word processing (23.4%), email (19.8%), Internet (13.9%) and spreadsheets (10.6%). Areas that experienced lower growth in the advanced category were: web page authoring (5.7%), image editing (4.1%), and digital photography (2.4%). Web 2.0 tools (blogs and wikis) were the only application that registered a negative movement at -1.8%.

Teachers, therefore, over the course of the research demonstrated an upward trend in most of the 11 applications and could be summarised as having:

- an advanced to competent understanding of the use of word processing (creating with ICT), email and the Internet (investigating with ICT);
- a basic understanding of the use of Web 2.0 tools (blogs and wikis) (communicating with ICT, and video editing/web page authoring/podcasting/movie making (creating with ICT); and
- improved their own level of ICT competency in the 11 applications since the start of the laptop program (managing and operating with ICT).

The following excerpt with CL47, a member of the School leadership team, shared a view of the gradual and steady improvement in general teacher operational use of the laptops for teaching and learning:

> I think it is becoming better. I mean, we have the ability now to relate to more data, more quickly, and we do that through a whole range of new mechanisms like the portal, our e-reporting, our keystroke reporting, the ability to monitor what students are doing by Casper [Endpoint management system for managing Apple devices]. So all those aspects have allowed teachers to dig a lot deeper and see what students are doing and how they are going about their business with the ICT. So it is almost like the students have forced the teachers to develop their own skill set. So I think that we are certainly ahead of where we were. I think if you were to take a snapshot of the teachers' skill-set now and say has it developed exponentially over three years, I would say no. It has been a fairly moderate lineal increase but it certainly is increasing. (CL472012)

Another area of change that was noticed since the implementation of the 1:1 laptop program was teacher use of the School portal. The School portal was developed by an external IT solutions company using SharePoint, as a platform for information provision to students and parents. Teachers were using this as a platform to distribute course content and also upload assessment results. Between the first year and third year of the study, 18 teachers had mentioned the use of the portal when operating with ICT:

> I have got easy access, I can either put it onto the portal for student downloads and that whole delivery of instruction from my perspective as a teacher, works a lot easier. The portal enables me to put information up regularly, and I also use it for the online reporting. (C532012)

The School portal served as another medium for teachers to operate with ICT regularly. The section Communicating with ICT discusses the use of the portal in further detail.

4.5 Investigating with ICT

The following section uses the following three LEA: investigating reality and building knowledge, laptops as a research tool, and for assessment as a focus for investigating with ICT.

4.5.1 Investigating reality and building knowledge

Six teachers offered comments during interviews that laptops were useful as a tool for helping students to investigate and carry out independent or assisted research. Examples include:

> They can learn so much more and they get so much more out of laptops. They get more interested in it and they get to express themselves in individual ways. Also, it builds on what you're teaching and where you finish off the children can take over, and also the boys can, they can learn from each other and learn new things to apply to their projects. (C442010)

> Laptops are a good investigation tool. They allow students to research and find answers to questions ranging from inferential to evaluative questions. (C572012)

Item One of the annual questionnaire required the teachers to indicate how often laptops were used to investigate reality and build knowledge. Figure 4.15 shows a three year mean score of 3.1 ± 0.2. The results suggest that the 10-25% percentile option remained stable between the first year and third year.

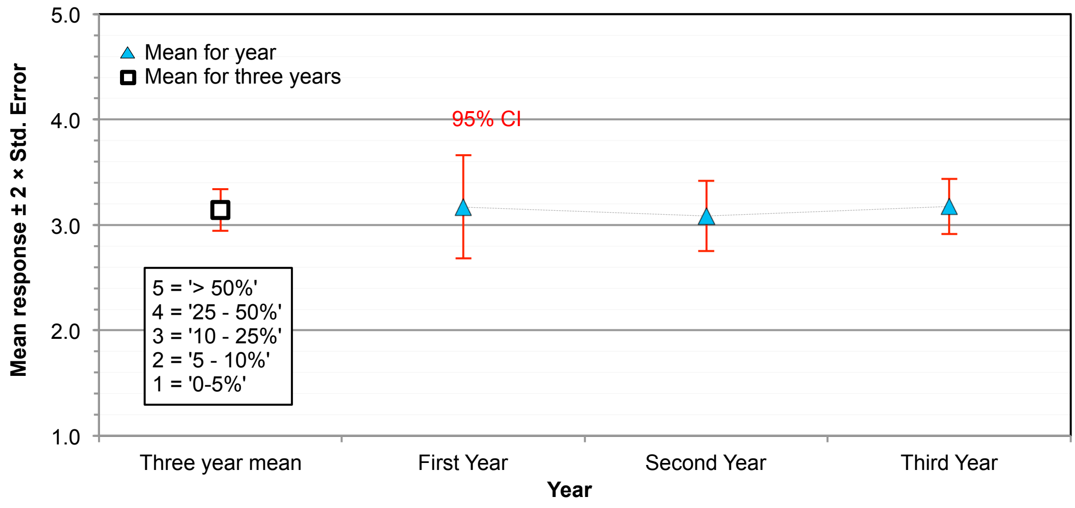


Figure 4.15. **Mean responses of teachers estimating the percentage of time laptops were used to investigate reality and build knowledge.**

Investigate reality and build knowledge were terms used by teachers to describe how the laptops were used as a research tool to search and uncover information for learning – i.e. investigating with ICT.

4.5.2 Laptops as a research tool

Question one of the annual interviews asked: "How do you use laptops to support student learning?" Teachers indicated that they used the laptops predominantly as a research tool and to help students to produce work. The term "research" was mentioned 35 times by 31 of the teachers. For example:

> I guess the main purpose is always try to use it to engage the boys. For research would be a main purpose. (C672011)
>
> We use the laptops primarily in my classes, use them as a research device and as a viewing tool. So that is for students to research some of the concepts that we are studying in class, to try extra bits of information and to view some of the other extra sort of materials like YouTube they might be using. They might be researching posters, film posters, news photography, those types of things. C552012)

These responses imply that from the first year to the third year of the study the teachers held the stable view that the laptop was a powerful research tool enabling students to access and acquire knowledge quickly and when required. Accessing the Internet was also a common theme that emerged as 25 teachers indicated they used it regularly:

> Again research based. I use it mainly for the Internet because at the tip of your hands you'll have a wealth of resources and information. Personally when I'm teaching I will use it for documentary purposes. You can pick things off YouTube, you can show things, images, which before I could only just speak about and describe. (C322010)

The notion of the laptop being used as a tool for inquiry, in particular research, resonated with teachers. Accessing the Internet was widely used for teaching and learning.

4.5.3 Laptops for assessment

Over the three year period of the study, views about assessment were prominent in the annual interviews. Two specific questions in annual interviews draw responses about assessment. Question Six asked teachers: "Have you assessed work that students have done with laptops and how has this been included with your overall assessment process?" The majority of teachers (31) indicated that they had assessed work that students had made using their laptops. Question Seven required teachers to respond to: "How important is the use of laptops to your assessment process?" Most teachers (28) felt that it was important and a part of their assessment process:

> It's an integral part of it; it is part and parcel of how we assess now. (C372012)

Eight teachers shared the view that assessment was not a major focus nor critically important. However, teachers felt that there would be a greater number of possibilities for using laptops for assessment in the future:

> It's not of primary importance at the moment, but I think that will change. (C392010)

> I guess it's going to be more important as I get better at assessing with laptops. (C422010)

In response to Question Six and Seven, teachers generally referred to five types of assessment. These assessments were: written (word-processed) pieces of work (23), presentations (14), online (10), assignments (9), and investigations (9), Figure 4.16 shows the coded responses for the five assessment types.

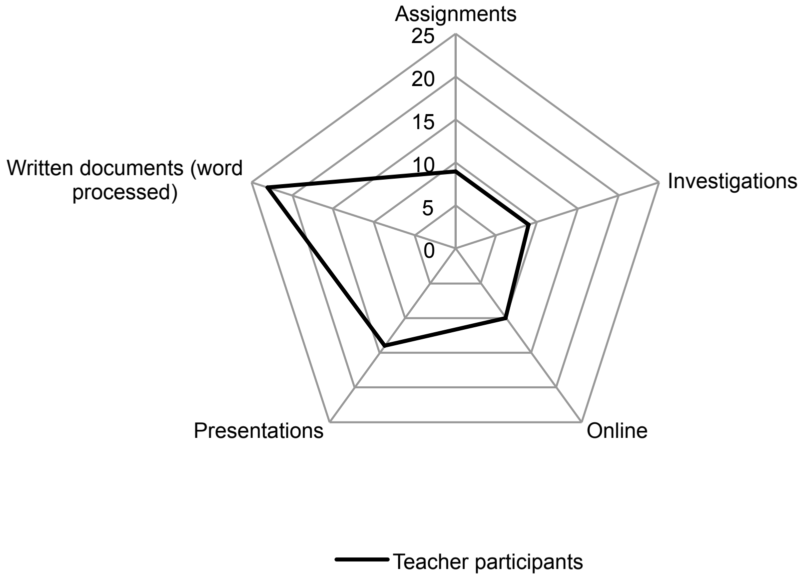


Figure 4.16. **Frequency of teacher participants coded responses for types of assessments.**

It was evident that teachers were using written documents, presentations, online assessments and assignments regularly for assessment with laptops. Assignments and homework tasks were classified as take-home and complete projects:

> [Written documents] I think the majority of assessments are still written in the in-class assessments, but I mean, I do require most ... Sorry, most assessments in class are written, however, most assignments I ask to be typed up and an electronic copy of it emailed or typed up. So it's vital, I would say. Although the in-class component is still written. (C572012)
>
> [Presentations] Most assessments that we do bar probably two a year, particularly in English and Religion are done using the ICT. And not just word processing but, you know multimodal PowerPoint presentation. (C432012)
>
> [Online] Mathematics, for example. That's the beauty with this one is we have this book that we use from Jacaranda Plus and then with it comes with this assessment called Assess On. With Assess On I can set a test for the boys and then ... multiple choice of course, and then send it out to the boys, assign it at a certain time, and assess at a certain time as well. It's amazing because at the end of that session, let's say if a boy fails to submit a test, it will auto-submit, and then at the end of that session, the boys can then check what they got and they can also ... it's immediate like that, it's really, really fast, and they can check where they went wrong and what the correct answer is and it explains to them why their answer was wrong. (C312012)
>
> [Assignments] The other thing that we did was we've done a few different assignments where they were typed up and submitted to the portal pages. (C652012)

There appeared to be an interest with teachers using online assessments. Ten teachers were using online sites such as Maths Online to set up homework modules. These provided quick summative assessments and at the same time gave formative information about where the students were at that point in time:

> First in terms of immediate feedback to their students but also the scaffolding that surrounds it. So students using things like, My Maths Online where the teacher can set a homework module, where that homework module has a set amount of time to work, to do that homework in and then when the reports are generated are quite diagnostic and go back to the student and to the teacher. They are very good. And, you know, we've had a year of transition onto that and I would expect that that would be even bigger news next year. (C542012)

By the third year of the study, teachers had shown an incremental change in how they were using laptops for online assessment. Previously in the first year and second year, feedback had indicated that laptop use for assessment had focused on lower order tasks. These being tasks such as investigating a research topic or responding to a particular subject area covered at the School. Teachers over time had become open to using laptops as an online assessment tool:

> I have used Socrative [student response system] as an assessment tool. That is more likely at the end of the unit thing to test their understanding. A couple of times I have used it as an informal thing as well, just for them to be aware what Socrative is all about and how to use it. (C562012)

Despite this, there was still a mention of the difficulty associated with online assessment and feedback. This example demonstrates how this teacher participant provided feedback for students:

> It works well, it's worked well, it's the first year we've done it this year so we assess their style, their contribution and their effort in keeping the blogs going and starting their own threads. Students still use Dropbox to give us assessments and to put them online. I find it very hard as a teacher of 20 years, I find it hard to actually.... I like writing prolific comments on the students' writing so that the page is covered in red and I find that far more difficult to do when they're submitting electronic versions of their work than hard copies. So I tend to lean towards students giving me hard copies so I can give them better feedback. (C552012)

Four teachers saw a contradiction between online assessment at school with a perceived culture in higher education that supported written examinations. These teachers shared a view of the importance of pen-in-hand to practice for those assessments that did not need a laptop, referring to examinations where the use of a pen was non-negotiable:

> When it comes to assessment I still believe that pen in hand time is important so do not use a laptop, more pen and paper tests. The laptop is great, however let's face it most of if not all of university assessments [examinations] are all hand written - and here we are asking them to do assessments on the laptops. It is a bit of a concern or should I say contradiction. (C582012)

Teachers do find themselves in quite a dilemma when having to use laptops for learning. On the one hand, there is a big push by the Australian Government and its relevant education agencies to send out the message to use ICT effectively and incorporated with other learning competencies (DEEWR, 2009). On the other hand, schools have to be cognisant of the required curriculum and the traditional nature of the end of unit, semester or year testing, where examinations are all hand written (Hennessy et al., 2005).

4.6 Creating with ICT

Question two of the annual interviews asked teachers: "What are the main purposes for you to use ICT with your students?" Teachers interviewed, responded with the following eight types of activities:

- word processing documents;
- mind maps;
- movies and podcasts;
- music;
- portal pages;
- presentations;
- images, animations and multimedia; and,
- spreadsheets, graphs, charts and tables.

Responses were coded into these eight areas between the first year and the third year, and are shown in the radar graph in Figure 4.17.

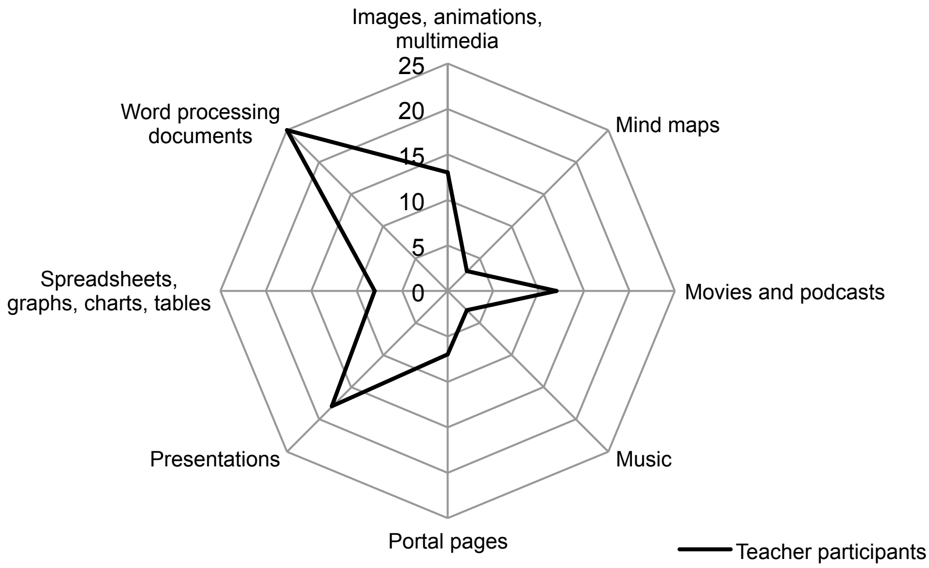


Figure 4.17. **Teacher participants coded responses between the first year and third year for creating with ICT.**

A total of 25 teachers indicated that they created documents using word processing packages such as Word or Pages. These documents were specific to learning areas for students to complete or use as references for learning:

> I regularly use a word processing program to create documents for my classes. If it is a rubric for a learning task or information that I require them to read, I find myself regularly creating these documents. (C442010)

Creating presentations was another frequently used method, with 17 teachers responding to the creating with ICT skill. Teacher participants reported that they created Keynote or PowerPoint presentations for the delivery of lessons regularly:

> I do use a lot of Keynote presentations to start a lesson or introduce a theme. This helps to focus the students and also engage them, instead of me just talking. (C312012)

> So term four, this term, I used a lot of PowerPoint presentation compared to semester one, and that's for Year Nine's. (C562012)

For specific ICT-based learning, laptops were used to demonstrate student creativity at a higher level with 13 teachers' citing examples of creating animations, images and multimedia. The following excerpt is from an Integrated Computing teacher from the second year of the study, who extensively used Adobe packages:

> For Year Eight's [Cohort B], definitely to create and explore, obviously we have a range of programs in the Adobe packages that we use extensively and also we've tried to explore building apps down that path. (C502011)

Seven teachers indicated they created portal pages for students to access for learning. The School portal was used reasonably well by teachers for uploading these documents for students to access:

> I've got easy access, I can either put it onto the portal that I created for student downloads and that whole delivery of instruction from my perspective as a teacher, works a lot easier. The portal enables me to put information up regularly and I also use it for the online reporting. (C532012)

Teachers cited an extensive set of examples of students using ICT to create work. The creation of documents and presentations were the two most common reported examples of creating with ICT. Creating movies and podcast, and images and animations also emerged as the study progressed.

4.7 Communicating with ICT

The structure of the following section has a focus on the use of the School portal, the utilisation of laptops for collaboration or cooperation, and the use of email as a mode of communication.

4.7.1 Portal communication

Seventeen teachers indicated the use of the School portal as an important mode of communication with students. The portal enabled teachers to create content and then distribute it for student access:

> Also through the portal, so if I put documents, worksheets, things like that on the portal rather than giving a printed copy or editable worksheets up on there, it is very useful as well. (C652012)

This use of the portal was more notable in the third year of the study. The School had placed a considerable focus in the development and implementation of a new and improved portal. The implementation took place at the end of the second year and was operational at the start of the third year.

4.7.2 Collaboration or cooperation

Item Seven required teacher participants to indicate how often laptops were used to increase collaboration or cooperation. The mean scores declined somewhat from the first year (2.8 ± 0.2) to the third year (2.4 ± 0.3), although it was not statistically significant. The three year mean score of 2.5 ± 0.2, indicates teacher use of laptops for collaboration and cooperation were between the 5-10% and 10-25% percentile options (see Figure 4.18).

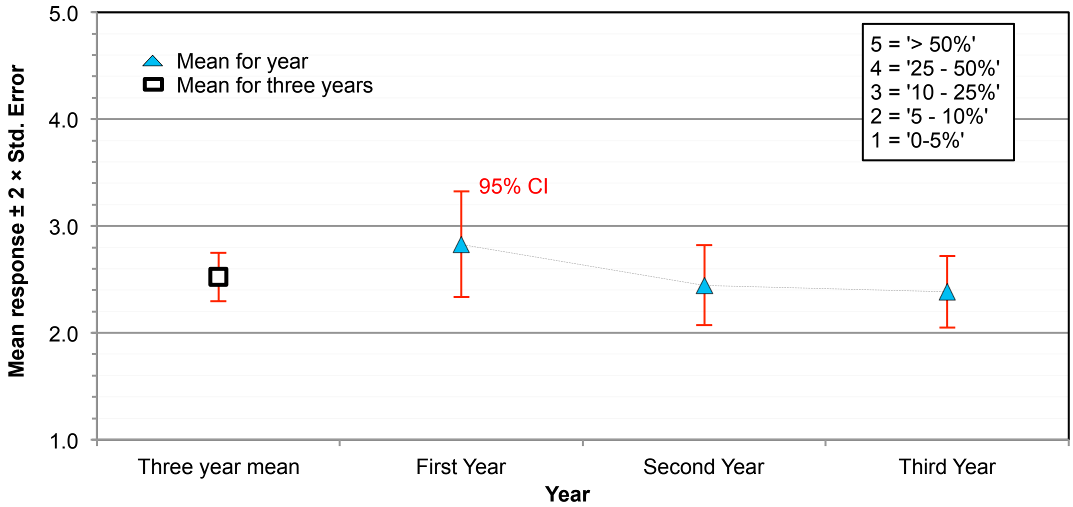


Figure 4.18. **Mean responses of teachers estimating the percentage of time laptops were used to increase collaboration or cooperation.**

The utilisation of collaborative tools could be dependent upon the availability of appropriate software, suitable topics, and space within the syllabus. The qualitative data supports this assertion:

> I think it has ... Harping back to that collaboration thing, I think it ... Maybe, I don't know, it may have made them a little bit less collaborative in a sense, probably, they're more focussed on their screen and what they're doing, and so therefore, you know, when we come for the obligatory class discussion, lids down, I find there's not a lot of interest in doing that, you know. (C602012)

> There's sometimes perhaps a bit less engagement within groups and perhaps less partner work, you know, the cooperative learning strategies that aren't being perhaps used but whether or not that's a laptop issue or whether that's a senior school mentality issue, I don't know. (C232012)

Teachers revealed apprehension in the use of social media for communication during lessons. There was a recognition that students were communicating online, though it was not being encouraged at the School:

> I mean, the interaction with other students online is not so much something I am encouraging boys to do, but they obviously have that interest and that push and I think some are in this new version of the web. That is going to be part of it with me, that I'm not a native user and I can't feel comfortable with Twittering something or in terms of sharing it with someone else and getting it back even though I tried it in certain ways with online sort of tasks and so on. (C532012)

There were no examples of social media such as Facebook or Twitter being used for learning by teachers to communicate with students. The School did not support social communication tools being used on campus.

4.7.3 Email

One mode of communication that teachers did use with their laptops was email. Unrestricted email communication between students, teachers and parents was organised via the School server. Twenty-four teachers indicated that they felt comfortable with this mode of communicating with ICT and reported using it with their students:

> I do not mind communicating with them and I find that somehow also it gives me the chance to encourage them. I have on occasion maybe sent back an e-mail that encourages them and congratulates them, just a small little message that maybe sometimes we do not get enough of an opportunity to do face to face because in a busy classroom it does not always happen. (C372012)

Therefore, communicating with ICT in most instances was by students accessing the school portal or via email between the teacher and student. Social media had not played a part in communicating with ICT for teacher participants.

4.8 Applying Social and Ethical Protocols and Practices when Using ICT

As stipulated in the Statements for learning for ICT (MCEETYA, 2006) and the ICT capability in the Australian Curriculum (ACARA, 2010a), there is a need to understand the role of ICT in society and the impact it can have on all users. Sherratt, Rogerson, and Fairweather (2005) highlighted that raising student understanding of the topic is not always clear. As the research progressed teachers became increasingly aware of the need for students to use their laptops responsibly. There was a clear message being conveyed by teachers about being responsible online members and users of ICT:

> I just see it equivalent to, like, literacy standards, like, you've got numeracy and literacy and now you've got IT standards that are sort of to be an acceptable member of an online community or a producer rather than just receiver. I mean, this whole idea of taking someone else's work ... not necessarily plagiarism aspect but certainly I couldn't do that myself and you say, 'Why couldn't you communicate this to others? Why couldn't you put it out there?' Whether it's just on our portal for others to share, well, why is it just a passive device for you, you're at the end of a very long funnel. That was basically where I see these boys having to be at their place in society in the future. (C532012)

> In terms of what they're getting associated with, in terms of knowing right from wrong, the ethical balance. That's not necessarily a classroom issue but certainly if they're doing that within a class at the time when they're online doing something else then that's just an issue of how they present themselves to the web and the community and where their footprint's going to be, all over the place for years to come. (C632012).

These sentiments portrayed a view about how to use ICT ethically not just in the School environment, but also amongst the broader community.

4.8.1 Issue: Plagiarism

An example of an ethical issue to emerge since the implementation of the 1:1 laptop program was breach of copyright. When conducting a text search query in NVivo for the words 'cut and paste' and 'plagiarism', six of the teachers mentioned these terms in their respective interviews over the three year period of the study:

> Well, it's a problem with Year Seven because it's so observable now they have got this laptop at their fingertips. I think the younger years, seven's and eight's still have this issue because we are striving for better results. How do we get the better results if I am limited in my vocabulary, just cut and paste. Or if my time is too precious, cut and paste. So that is the issue we have. And that is the problem we will have with something so at your fingertips. It is so much at your fingertips. And as distinct, like if we were little kids and we were writing, handwriting something like that, why would you handwrite a whole lot of boring gibberish, it is too hard for us to spell, but with laptops it is cut and paste. It is instantaneous. And that is the problem we face. (C322010)

> My concern is that the level of plagiarism is still too high, and that is plagiarising from the Internet mainly but also the potential to plagiarise from other students (C612011).

There were two teachers who mentioned plagiarism in the third year. In terms of the research and the creation of authentic work, it became evident teachers shared a concern about the use of the Internet and plagiarism. With greater access to the Internet, Ma, Wan, and Lu (2008) suggested that there seems to be a link to the deterioration of ethics.

4.8.2 Issues: Distractions

The potential for distraction was a concern to teachers, with 56 references made by 29 teachers over the course of the study. The following examples demonstrate teacher concerns:

> Some are always off task unless you're standing behind them. C512010

> It was a big challenge and even the best students, the most focussed students have admitted to being very easily distracted and tempted to browse unnecessary things online or open up a program and play a game online or do things that are not really task specific. (C372011)

In the first year, the annual teacher questionnaire did not have the subject of computer games included within the questionnaire. However, after the collection of data in the first year, playing computer games and off-task behaviours appeared as a theme of the research and was therefore included as a question in the second and third years of the questionnaire. Figure 4.19 demonstrates an increase of 19.8 percentage points in Item 27 (d) from the second year to the third year, with teachers indicating that playing computer games in class was still a problem.

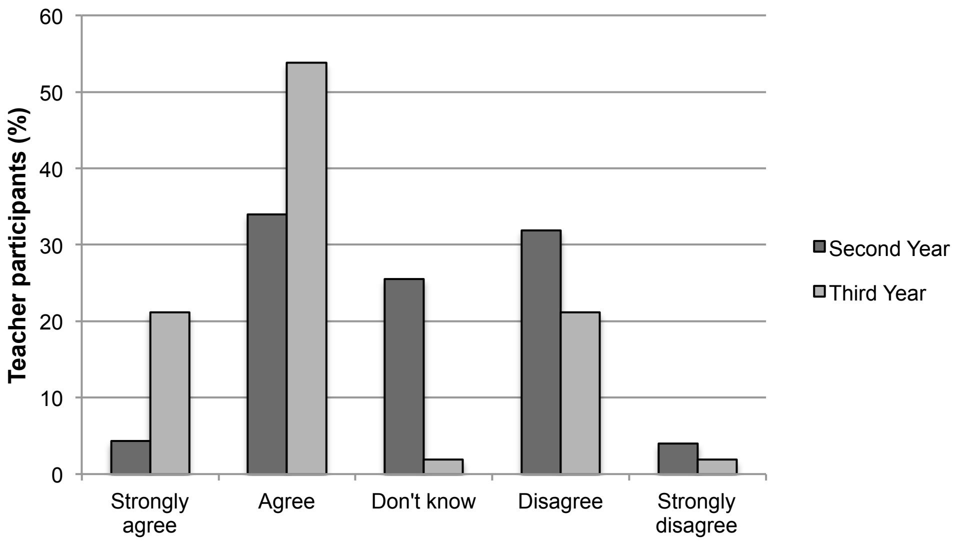


***Figure 4.19.* Teacher participants' views on the statement 'playing computer games in class is still a problem.'**

Of significance is that in the third year only 1.9% of teachers responded with '*don't know*'. This reinforced the view shared by teachers during interviewing that playing computer games continued to occur in classes. It is likely over time teachers became wiser to off-task behaviour, and this could have been responsible for the increase in perceptions between the second year and third year that students played computer games in class.

With the emergence of playing games and the associated distractive behaviours that can be related to the use of a laptop (e.g. frivolous Internet searches, being side-tracked using widgets and other applications), the School introduced a revised framework for acceptable ICT use at the commencement of the second year of the research. Item 27 (c) required teachers to respond to the Likert-type scale of: *strongly agree*, *agree*, *don't know*, *disagree* and *strongly disagree*, for the item: 'Implementing a clear framework for acceptable ICT use has improved the classroom dynamic.' A total of 57.4% of the teachers in the second year agreed that the introduction of the framework had improved the classroom dynamics as seen in Figure 4.20. This decreased in the third year by 7.4 percentage points to 50.0%. In the third year there were 13.5% of teachers who disagreed about the impact of the framework, which was an increase of 9.2 percentage points from the second year to third year.

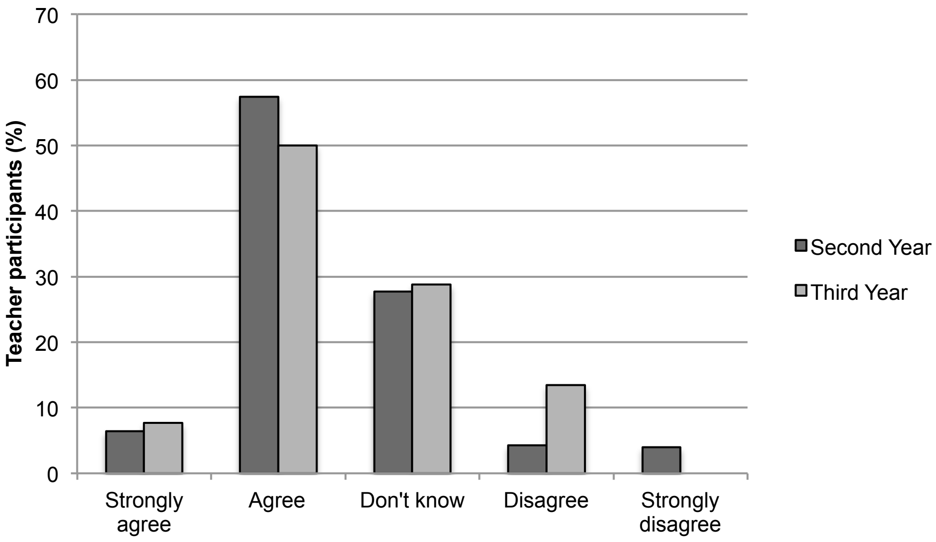


Figure 4.20. **Extent to which teacher participants' agreed or disagreed with the statement: 'Implementing a clear framework for acceptable ICT use has improved the classroom dynamic.'**

Nine teachers recognised gaming and other non-related learning activities (e.g., social media) as a distraction initially; however, over time this interpretation diminished due to a range of initiatives by the School and also the new skill sets acquired by the teachers. Teachers had become better prepared and aware of the off-task behaviours, and applied more practical solutions in their classrooms:

> Well, I've got, like, a U-shaped classroom with groups of desks in the middle of the U, so everybody can see the board. Whenever we've got laptops out I'm always moving around as well because you're asking for trouble if you're not, to be honest. (C492012)

The classroom dynamic had changed with the introduction of laptops for learning through the experiences shared by the teachers. Aspects such as maintaining student engagement and involvement throughout a lesson now became of greater importance as the laptop could be misused and further increased the chance of distractive patterns of behaviours, in turn minimising the potential for learning. A teacher's solution, as impractical or irrational as it may seem, would be for them to decide not to use the laptop, or drastically reduce its use to counteract such potential for distraction. This was not witnessed in classroom observations at the School; however, such actions are possible in the light of the diverse beliefs and skillsets of teachers at the case study site.

4.9 Overall Teacher Satisfaction with the Laptop Program

The following section focuses on the overall teacher satisfaction in the areas of: teacher laptop use for learning, observed laptop use for learning, the amount of time laptops were used for learning, student role in learning, and the value of laptops.

4.9.1 Teacher laptop use for learning

Laptop use in education implies a changing teacher role and also a dynamic approach to pedagogy. As discussed in the UNESCO ICT Competency Framework (2011), the successful introduction of ICT into the classroom depends on the teacher's ability to restructure the pedagogy used, and develop an active learning environment that is engaging and adopts innovative ways of using technology.

When using laptops for learning more often than not teachers are left to their own devices to implement a set program. Figure 4.21 provides data for Item 13 (difficulty in use of laptop), Item 14 (enjoyment) and, Item 15 (want to know more) to understand how teachers felt about using laptops in these areas.

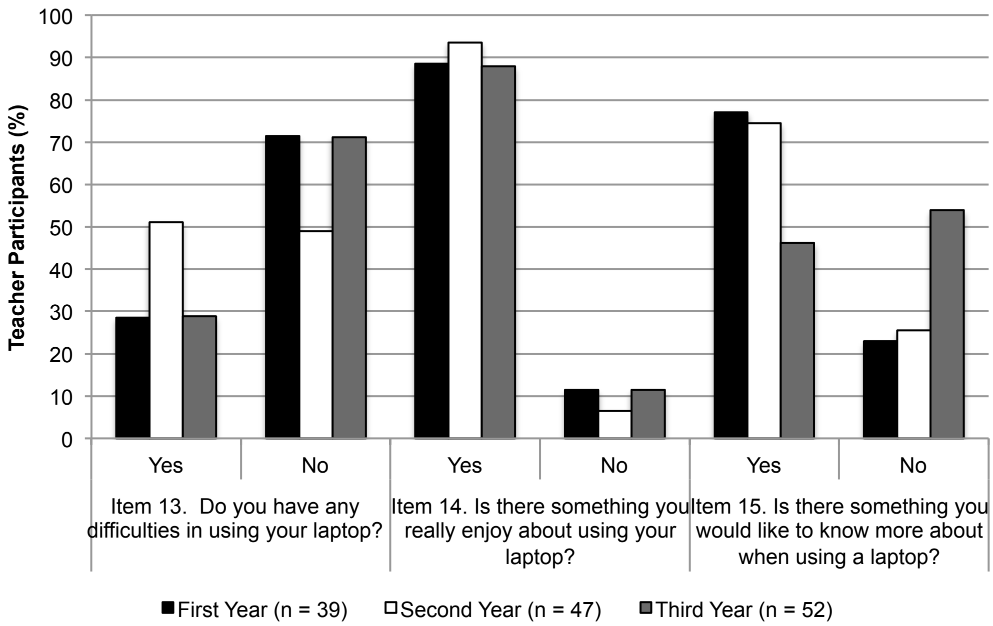


Figure 4.21. **Teacher participant responses to difficulties, enjoyment and questions about their laptop.**

Item 13 recorded a three year mean of 36.2% for teachers indicating difficulties in using their laptop while 63.8% of teachers indicated they did not have any such difficulties. Teachers (90.2% - three year mean) generally enjoyed using their laptop according for response to Item 14. Approximately two-thirds of teacher participants (65.9% - three year mean) responding to Item 15, indicated they would like to know more about using a laptop. Although this dropped sharply in the third year of the study, possibly indicating that professional development was having an impact. Table 4.6 presents some comments from teachers who answered 'no' to Items 13, 14, or 15.

Table 4.6
Examples of Teacher Participants Answering 'No' for Items 13, 14 and 15 (Problems with the Laptop)

Year	Teacher	Examples of 'no' responses to Items 13 to 15
2010	C79	Changing to Mac's had its inherent problems plus new programs to try and deal with the next wave of student-centred learning with all its bling and very questionable degree of substance.
	C102	A world of external frustrations! Does email have to be called Entourage?
2011	C55	Other than network problems, like wireless issues, no real problems.
	C40	I still find some of the programs / apps challenging to get my head around. Need time to master these, but still feel I am doing OK even though there are still challenges ahead.
2012	C56	I am comfortable using the various applications available on the laptop, such as Pages, Keynote, Word, PowerPoint. Difficulties arise when the laptop does not function properly, leading to the inability to use the applications in my classes, blackouts and shutdown.
	C76	For the most part, it is reliable, although I have had problems with email at times.

4.9.2 Observed laptop use for learning

Over the course of the three year study 30 classroom observations took place (eight observations in the first year, 12 observations in the second year and 10 in the third year). In a form of triangulating the data as discussed in Chapter Three, the observations were scheduled to determine how teachers were using their laptops, and also whether teachers' assertions regarding their laptop use was borne out in their classrooms. The observation instrument used, known as FITCOM, was initially developed by Judson (2006) to determine teachers' use of ICT in the classroom. As described in Chapter Three, the instrument allows the researcher to make qualitative judgements on the extent to which the classroom experience resonates with identified good practice in the integration of ICT. The instrument was in the form of a 25 item Likert-type scale classified into five areas: design of technology integration, class dynamics, meaning and purpose, content and knowledge, and technology as tools. The observer then rates each one of the five areas from 0=*never occurred* to 4=*occurred frequently*. From this, each individual item had a total score of 20, meaning that the instrument had a collective total of 100. It was possible for a teacher to register a score of zero to 100 (see Appendix K).

FITCOM was the foundation of the research that Bate (2010b) used in his 'longitudinal study of beginning teachers' pedagogical identity and their use of ICT.' Bate's research was interested in how teachers were using ICT in their teaching and hence he adapted Judson's instrument to an Australian school setting. Both Bate (2010b) and Judson (2006) revealed a gap between what teachers said they were doing and what was actually happening in practice. To further expand on the results of the current study, Table 4.7 displays the mean scores; standard deviation and weighted average for each of the three years the participants were observed in the current study.

Table 4.7
Mean Scores for the FIT:COM Observation Tool Used in the First Year to Third Year

Year	Mean (%)	SD
First Year (n = 10)	43.2	10.8
Second Year (n = 8)	48.5	12.9
Third Year (n = 12)	53.5	11.2
Weighted average	48.8	

Observations revealed that there was a mix of ways in which the teachers used technology whilst being observed by the FIT:COM observation instrument. Lessons appeared to be teacher directed when using the laptops in the three year case study. In teacher-directed lessons the teacher typically used an interactive smartboard or data projector to commence a lesson or introduce the topic to be covered. This was the case for both of the student cohorts observed in a classroom setting. Lessons demonstrated a range of teaching approaches, but were predominately well managed and controlled with the immersion of these technologies, which is similar to the view of Beauchamp and Kennewell (2008). A total of 16 of the observations required the students primarily to use the Web to either access information or to use games or applications. Games were subject specific and in the areas of Mathematics (Mathletics, Geogebra and MyMathsOnline) and Literacy (Spellodrome and other web-based games in the area of spelling or punctuation). The games and simulations were only used for a marginal proportion of the lesson and more as a reward or extension component of the lesson – drill and practice. Overall, in most instances for both Cohort A and Cohort B, the types of lessons aligned towards operational and investigation categories of the framework as seen in Figure 4.22.

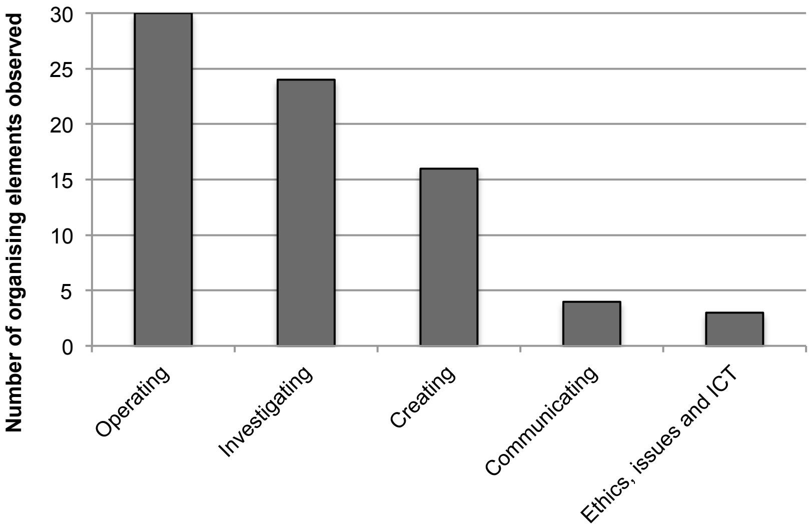


Figure 4.22. **Lesson observation of teacher participants' laptop use for learning.**

4.9.3 Amount of time laptops were used for teaching and learning

Akin (2012) stated the ongoing cost of laptop programs is an issue in discussions between schools and parents around outlaying funds for such initiatives. How often and how much laptops are used is a key question. Leadership at the School did not stipulate how much students and teachers should use the laptop and, in fact, advocated a balance. For example:

> Of course, you can do anything but ... no, and I think ... I was pretty gratified to hear Leadership say on Saturday at the student orientation day to the parents that if your son comes home and says, 'I only used my laptop today for an hour,' then that's fine, don't be worried about that, that it is a tool, whereas the rhetoric that we were sort of

> using from the very early days was that this was somehow revolutionary and I'm not sure that ... I mean, I think probably generally voices have said, 'Yep, it's great, we love it, but there's also other things we need to do as well.' (C492012)

As recognised by the teachers through the three sets of annual interviews and questionnaires, the laptop was considered to be a very powerful tool, which had become a common piece of equipment as part of the learning process. The greater focus, however, was on delineating how the laptops were being used for teaching. Item 11 and 12 of the questionnaire required teachers to estimate the amount of time they were using their laptops for teaching and learning each day, and to also estimate the amount of time their students were using their laptops for learning each day. Caution should be applied to the imprecise nature of these estimates as the use of computers can be intermittent in nature, due to the thinking activities which precede the use of keyboard or screen. Figure 4.23 presents frequencies of response, to teacher questionnaire Items 11 and 12, pooled over three years.

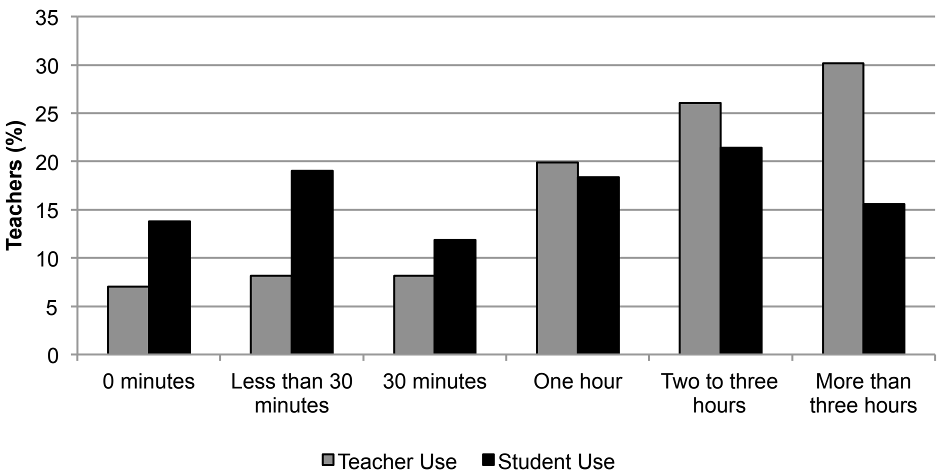


Figure 4.23. **Teacher participants' estimated use of laptops for teaching and learning for self and their students' use for learning as a frequency pooled over the three years.**

Teachers perceived that they used their laptop for teaching and learning for more time than their students used a laptop for learning. This is further highlighted in all three instances of the laptop use for teaching and learning categories: *one hour*, *two to three hours* and *more than three hours*.

4.9.4 Student role in learning

Fifteen teachers explicitly stated that students were inherently responsible in using ICT to support learning. This characteristic was explored in the responses to Question Nine of the annual interviews between the first year and third year: “What role(s) do the students have when using laptops for learning?”:

> So their role is firstly to use it responsibly but also to ensure people next to them sort of know what’s going on and if they encounter problems that they can help them because there are 29 of them and there is only one of me. But as I said, the first thing is to use it responsibly, that’s their big role. (C412010)
>
> I think it’s to be responsible users of it. That’s the most important role. (C552012)
>
> Responsible users, I think. I think that that’s a big thing. I think they still have the same responsibility as if they were using pen and paper, still putting their best effort and to make sure that if they’re using images they’re appropriate and they are referenced and they’re doing all those types of things also that you would expect if they were going to be doing it with cardboard and a pen. (C432012)

Teachers held the view that students were required to use laptops to access, create and present information responsibly as part of their role in learning. Therefore, laptops were integrated into the culture of the School, with an emphasis on responsible use.

4.9.5 Value of laptops

Question Four of the annual interviews asked teachers: “Do you think there is value in having your students use a laptop for learning?” A total of 33 of 37 teachers interviewed responded that there was value in students using laptops for learning. Figure 4.24 shows the percentage of teacher participant responses to this question.

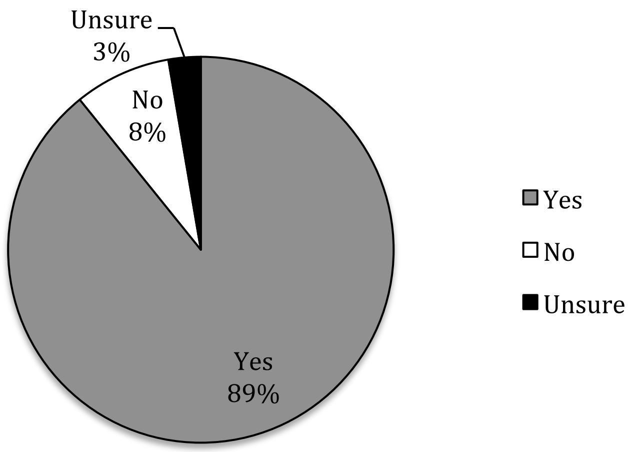


Figure 4.24. **Teacher participant's responses to Question Four: 'Do you think there is value in your students having a laptop for learning?'**

Through their experience over the three year period of the study, teachers had become aware of how to balance the use of the laptops in class for learning. By the third year of the study, teachers felt comfortable in having periods where the laptops were not used; however, there was a shared view of the need to integrate or use the laptops when needed:

> Overall, I feel that the introduction of the laptop has been beneficial to student learning. Our biggest challenge is ensuring that teaching staff are equipped with the necessary skills to deliver ICT rich lessons where the students can engage in learning which encourages higher order thinking skills. The access to information provides a real opportunity for staff to develop classroom activities or tasks that challenge the boys' analysis, synthesis and creative skills. (CQ522012).

Item 25 of the questionnaire sought teachers' views on student use of laptops by asking: "What proportion of time would you like to see students using laptops in your classes?" Over the three year period, there was a 23.1 percentage point decrease in the 50-75% percentile option. By the completion of the study, 76.9% of the teacher participants had indicated that laptops should be used between the 10-50% percentile options of lesson time, whereas only 3.9% were of the view that the laptop should be used in the > 75% of the lesson time as shown in Table 4.8.

Table 4.8
Proportion of Time Teacher Participants Would Like to See Students Using Laptops

Time	Inception %	First Year %	Second Year %	Third Year %	Inception to Third Year Change %
< 10%	2.56	14.3	12.8	11.5	8.9
10 - 25%	28.2	22.9	25.5	36.5	8.3
25 - 50%	30.7	20.0	40.4	40.4	9.6
50 - 75%	30.7	34.3	17.0	7.7	-23.1
> 75%	7.6	8.6	4.3	3.9	-3.8

When teacher participants (N = 23) in the third year annual interviews were asked, "Would you keep the laptop program or remove it?", all 23 teachers agreed with keeping the laptop program. The nature of the classroom had changed, with teachers having to have a strong understanding of how to manage and deliver a lesson within a 1:1 laptop classroom. Recognising these changes, the required skillsets in a 21st century learning environment, with additional but related areas such as learner engagement, collaboration, discussion and activity/problem-based curricula could become more of a focus for teachers. Teachers strengthened in their belief that the 1:1 laptop program was an essential aspect of the teaching and learning experience. This perception is similar to the view of Sugar (2002), who reported that teachers who are positive toward ICT use have the potential to negate the difficulties sometimes experienced when using ICT for teaching effectively:

> Laptops offer a much wider world to experience beyond what is possible from textbooks, documentaries and the teacher. I also consider ICT skills to be a fundamental aspect in the work place which students need to be able to use in a disciplined manner, which needs to be learnt. My ideal is an integration of ICT into my teaching to provide at least the basic of responsible laptop use, as well as the skills needed for work and to improve student learning. However, until there is a change in the WACE examinations [Year 12 examination], they will much remain an additional tool for the classroom, and not the central tool. (CQ832012)

Further to this view, eleven teachers believed there was a need for finding a balance when using laptops for learning. It was believed that a balanced approach was necessary to minimise an overreliance on laptops for learning:

> I think that it's a powerful learning tool used correctly, used effectively. I don't think it should be the total focus of what we're doing. I think there needs to be a balance. It's assisting, it's enhancing, that's the way I see it, and I think possible, and I've even

> sometimes got into that situation myself where it's become the total sort of thing in the lesson, and I think there is a sort of a problem ... I think there's a problem with that, and I think we need to be careful of it, because it can be just ... the teacher becomes superfluous in a sense and is there real learning going there – I don't know. (C602012)

Teachers clearly believed a balanced approach with the use of laptops was essential.

4.10 Summary

When applying the ICT capability learning continuum (ACARA, 2010a) to laptop use for teaching, teachers were predominantly using laptops for managing and operating, investigating and creating with ICT. There were examples of communicating with ICT and applying social and ethical protocols and practices when using ICT discussed in the chapter; however, not to the same extent.

This decrease could be attributed to students over time becoming more independent due to the individualised nature of each student having a laptop. Although, teachers sensed that collaboration and cooperation were important, the introduction of the laptop program had changed this attribute. It is important to note that students having laptops does not preclude using them for cooperation and collaboration. It depends how teachers structure the learning environment and activities. This may be an area of future focus for the School as Hattie's (2009) meta-analysis indicates that a cooperative and collaborative environment compared to that of an individualistic classroom had a higher effect size on student learning.

Teachers formed a position in regards to the amount of time that the laptops should be used within a lesson. It appeared that teachers felt comfortable with its use for 10-50% of lesson time. Teachers' own skillsets had improved in a variety of areas. Dealing with scenarios such as setting up a classroom, supervision, monitoring, gaming, off-task behaviours and the use of laptops for learning were all recognised as areas that increased opportunities for both the teachers and their students.

The aspect of laptop use in the broader context of teaching and learning will be discussed in detail in Chapter Seven. Chapter Eight discusses the ability to take ICT to a higher level and the possible need for political change to make this happen from a learning and assessment perspective.

CHAPTER 5.
Findings: Boys' Laptop Experiences

5.1 Introduction

This chapter reports how two cohorts of male junior (Cohort A) and middle (Cohort B) school students used their laptops in their daily lives for the three year period of the study. Students' use of their laptops is considered in context of schooling and that of the relevant perceptions of stakeholders, which comprise students, teachers, school leaders and parents.

As discussed in Chapter Four the ICT capability learning continuum (ACARA, 2010a) was the lens through which the study viewed student action. This chapter identifies themes that should be considered in the implementation of 1:1 laptop or mobile device programs within schools. The chapter draws on data from the annual questionnaire surveys (Cohort A: N = 56 at inception and Cohort B: N = 136 at inception), the annual semi-structured interviews (Cohort A: N = 10 and Cohort B: N = 20), five student forums held on the specific topic of gaming, and 30 classroom observations to investigate laptop use from the perspective of the student participants.

5.2 Student Background

The focus of this chapter is to understand how the boys used their laptops for learning. Educational literature suggests that students are motivated by working with ICT at school, however, their experiences can vary depending on their gender (Heemskerk, ten Dam, Volman, & Admiraal, 2009). There appears to be limited published research specifically into how male students use their laptops or mobile devices for learning. This study investigated a 1:1 laptop gender specific initiative to contribute to previous research which has focussed more generally on 1:1 laptop initiatives (Bebell & O'Dwyer, 2010; Lei & Zhao, 2008; Newhouse, 2005; Won Hur & Oh, 2012).

5.2.1 School attendance

Previous research provides no evidence to suggest 1:1 laptop programs improve school attendance rates (Abell-Foundation, 2008). However, recently in a research project in the United States of America, student involvement in a 1:1 laptop program seemed to indicate a reduction in the number of unexcused absences from the beginning to the end of the year (Rosen & Beck-Hill, 2012). The National Report for Schooling in Australia (ACARA, 2010b) presents the student rates of attendance for the comparative cohorts between 2007 to 2010. Table 5.1 displays the attendance data for male students within the Catholic sector of Western Australia between the years of 2007 to 2010. Included are the attendance rates for both Cohort A and Cohort B between the years of 2010 (first year) to 2012 (third year). The School attendance rates were similar to other schools in the same sector and did not substantially change through the period of the study.

Table 5.1
Male Student Attendance Rates, Catholic School Sector, State and Territory, 2007-2010

Year	Year Five %	Year Six %	Year Seven %	Year Eight %	Year Nine %
2007	92.0	92.0	93.0	93.0	92.0
2008	93.0	91.0	93.0	93.0	92.0
2009	93.0	94.0	93.0	94.0	94.0
2010	94.0	94.0	95.0	94.0	94.0
Mean (2007 – 2010)	**93.0**	**92.7**	**93.5**	**93.5**	**93.0**
Cohort A	90.7	94.6	93.0		
Cohort B			93.0	93.6	90.4

Note: Adapted from "National Report on Schooling in Australia, 2007-2010," by ACARA (2010).

The following section of the chapter will discuss students' initial views about learning with laptops soon after the implementation of the 1:1 laptop program.

5.2.2 Students' knowledge, skills and experiences at the inception of the study

At the beginning of the 1:1 laptop implementation (first year – March 2010) all 192 student participants from Cohort A and Cohort B were asked to complete a questionnaire, which consisted of 13 items. The purpose of the questionnaire was to gather baseline data, which assisted in providing background information about

Cohort A and Cohort B. In the interest of maintaining internal consistency in this chapter, a reference to an 'Item' refers to a question in the annual questionnaire, which is part of the quantitative arm of the study. Similarly, reference to a 'Question' indicates a question asked in the annual interview as part of the qualitative arm of the study.

Item One of the inception questionnaire presented 15 learning based statements to ascertain what type of work students experienced at school. Students were invited to indicate the extent to which they engaged in various classroom learning experiences by selecting one of four options on a Likert-type scale: *rarely*, *some*, *often* and *mostly*. Responses were then coded where 1 = *rarely*, 2 = *some*, 3 = *often*, and 4 = *many*. Figure 5.1 presents the results.

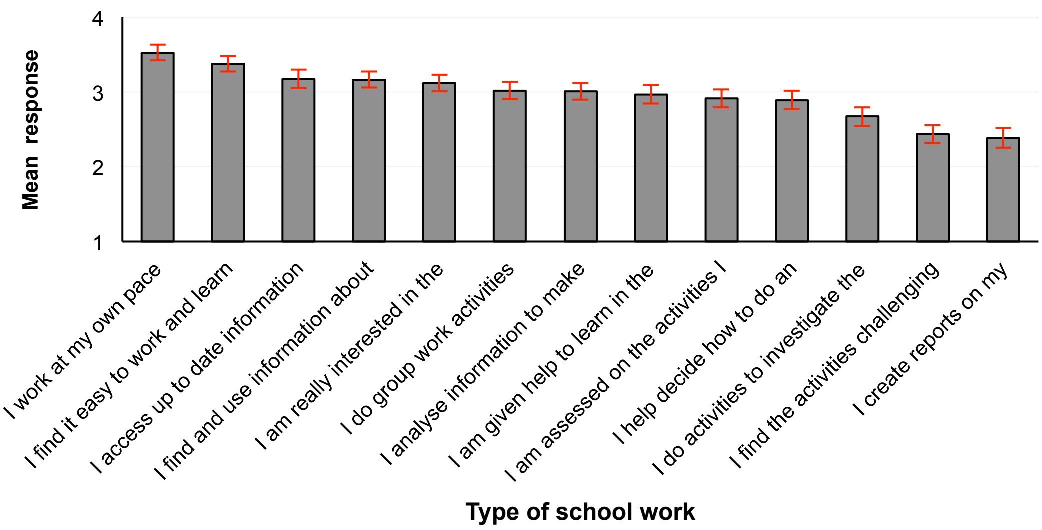


Figure 5.1. **Student mean responses for classroom learning experiences at the beginning of the study for Cohort A and Cohort B combined.**

The two highest scores were: "I work at my own pace" with a mean score of 3.5 ± 0.1 and "I find it easy to work and learn" with a mean score of 3.4 ± 0.1. Overall, most student responses were concentrated in the options of *often* to *some*. When asked to respond to the Likert items: "I find the activities challenging" and "I create reports on my investigations," students recorded a mean scores of 2.4 ± 0.2 for both, indicating a higher concentration of respondents ticking the *some* option.

Item two required students to respond to a range of applications about how laptops were used at the School during the first term of the first year of the study (see Figure 5.2 for student mean score). These were in the form of nine Likert items, part of a Likert-type scale: 1 = *never*, 2 = *rarely*, 3 = *some*, and 4 = *often*. It appeared that the students had used their laptops between the often to some options for: basic skills (3.6 ± 0.2), word processing (3.4 ± 0.2), graphics (3.2 ± 0.2), email (3.0 ± 0.2), Internet (3.9 ± 0.2) and other functions (e.g. Google Earth, Photo Booth, Atlas) (3.2 ± 0.2). Laptop use was not at the same level for video or audio (2.8 ± 0.2), spreadsheets (2.7 ± 0.2), and computer programs (2.9 ± 0.2). The result indicates that the students regularly used laptops for a small number of commonly reported functions. Similarly, a study by Keengwe et al. (2012) found laptops were regularly used for word processing, searching the Internet and creating presentations.

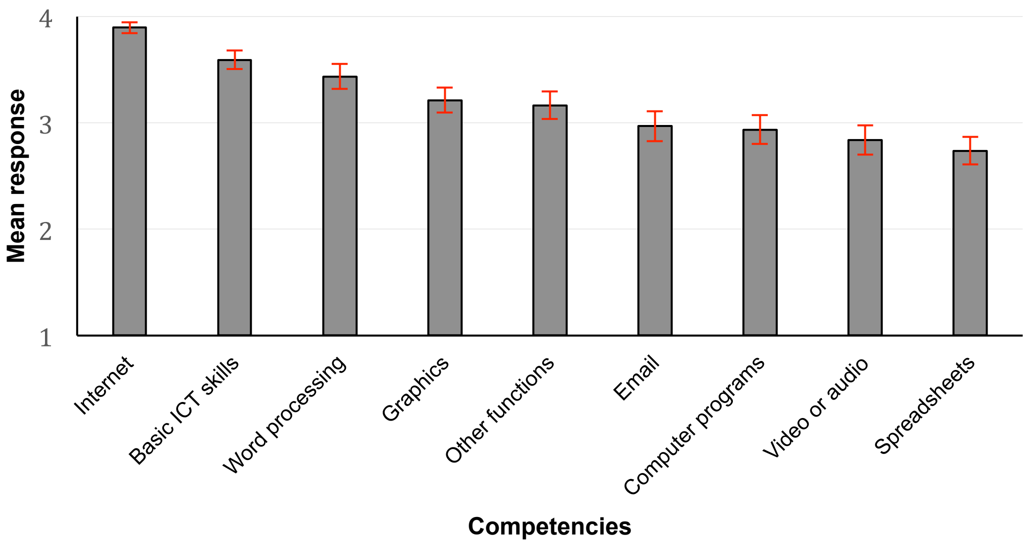


Figure 5.2. **Student mean scores for identified laptop competencies at the inception of the study for Cohort A and Cohort B combined.**

Item Four invited students to respond to a set of student impression statements about how they felt about using laptops at school (see Figure 5.3 for student mean scores). Response options were in the form of eight Likert items, part of a Likert-type scale: 1 = *never*, 2 = r*arely*, 3 = *some*, and 4 = *mostly.* The data suggests that, students felt good about using their laptops and had ticked either the *mostly* or *some* options. The lowest scoring item was, “I am given a choice to use a laptop for school work”. This may indicate that teachers, initially at least, were not inclined to give students too much choice preferring instead to provide a relatively traditional learning environment.

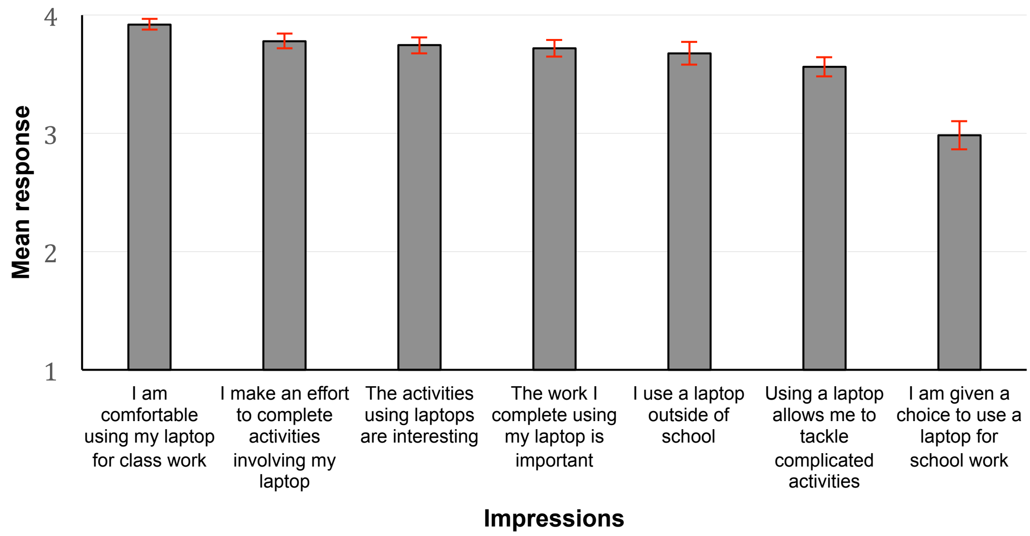


Figure 5.3. **Students' mean responses for impressions about laptop use at the School at the beginning of the study for Cohort A and Cohort B combined.**

Item Five required student participants to indicate the amount of time they used laptops at school each day. Laptops were used: *less than 30 minutes* (13.5%), *30 minutes* (10.4%), *1 hour* (23.5%), *2-3 hours* (34.2%) and *more than 3 hours* (18.3%). It is significant that over three quarters of students from Cohort A and Cohort B (76.0%), indicated using laptops more than one hour a day (see Figure 5.4).

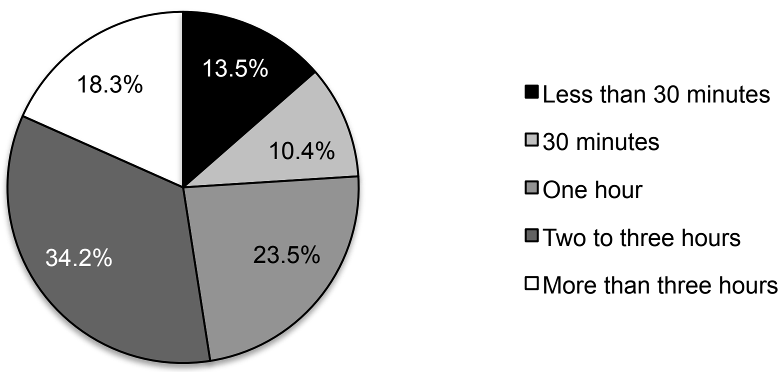


Figure 5.4. **Initial student estimation of amount of time in minutes laptops were used at school each day.**

According to Item Six, 73.4% of students reported not having difficulties using their laptop. Item Seven showed 94.2% of the students believed there was something they enjoyed about using the laptop. Item Eight reported 30.7% of the students wanted to improve their knowledge and skills of how to use their laptop.

These findings at the inception of the research suggest students were enthusiastic to use their device. Students used their laptops regularly for learning and outside of school. Most students (76.0%) used their laptops for more than one hour a day in class for learning.

5.2.3 Perceptions of the learning environment: First year to third year

The annual student questionnaire was administered to both Cohort A and Cohort B separately in November of the first year (2010), second year (2011), and third year (2012). Both questionnaires were the same in design and content and consisted of 25 items relating to student learning and laptop use.

Item One consisted of a mixture of learning statements (Newhouse, 2005) requiring students from Cohort A and Cohort B (Table 5.2 and Table 5.3) to respond to 13 statements about their learning (Likert items), part of a Likert-type scale: 1 = n*ever*, 2 = *rarely*, 3 = *sometimes*, and 4 = *often*. The following conclusions are drawn from Cohort A (refer to Table 5.2) and their views about what best described their classroom experiences. The highest recorded mean score was (3.7 ± 0.1) for Item One in the first year (d): “I work at my own pace”. Overall, students predominately ticked the *sometimes* option for the 13 student statements about their learning. A theme to emerge from the data was the decline in Item One (h): “I am really interested in the activities.” There was a gradual diminution of -0.2 annually in the mean score for the three years of the study from 3.6 ± 0.2 (first year) to 3.2 ± 0.2 (third year). This change was statistically significant (One-Way ANOVA, $p < 0.01$).

Table 5.2
Cohort A Student Participants Classroom Experiences Annual Mean Scores: Item One of Questionnaire

Learning Statements (Cohort A: N = 56	First Year Mean (SEM)	Second Year Mean (SEM)	Third Year Mean (SEM)
(a) I do activities to investigate the real world	3.0 (0.12)	3.4 (0.09)	3.2 (0.10)
(b) I access up-to-date information for my work	3.6 (0.10)	3.5 (0.09)	3.5 (0.08)
(c) I help decide how to do an activity	2.8 (0.11)	2.9 (0.11)	2.9 (0.10)
(d) I work at my own pace	3.7 (0.07)	3.6 (0.07)	3.6 (0.09)
(e) I do group work activities	3.2 (0.10)	3.1 (0.09)	3.1 (0.09)
(f) I am assessed on the activities I do rather than just tests	2.9 (0.10)	3.2 (0.09)	3.3 (0.10)
(g) I find the activities challenging	2.6 (0.10)	2.8 (0.10)	3.0 (0.10)
(h) I am really interested in the activities	3.6 (0.08)	3.4 (0.09)	3.2 (0.09)
(i) I find and use information about a problem or task	3.3 (0.09)	3.5 (0.08)	3.5 (0.09)
(j) I analyse information to make decisions in activities	3.2 (0.11)	3.4 (0.08)	3.2 (0.11)
(k) I create reports on my investigations	2.7 (0.11)	2.8 (0.13)	2.5 (0.09)
(l) I am given help to learn in the best way for me	3.3 (0.11)	3.3 (0.10)	3.2 (0.10)
(m)I find it easy to work and learn	3.7 (0.08)	3.5 (0.10)	3.5 (0.09)

By the conclusion of the study, Cohort A indicated learning became increasingly challenging whilst progressing from the junior to middle school. The mean score for Item One (g): “I find the activities challenging” between the first year (2.6 ± 0.2) and third year (3.0 ± 0.2) increased by 0.4, which was a statistically significant increase (One-Way ANOVA, $p < 0.01$). The results suggest an enthusiastic outlook towards learning for junior (primary) school students, which is consistent with Johnson and Holdway’s (2007) review of the literature about attitudes towards academic achievement and student satisfaction.

The three major themes arising from Item One for Cohort B (as seen in Table 5.3) were: (b) “I access up-to-date information for my work” (3.4 ± 0.1), (i) “I find and use information about a problem or task” (3.4 ± 0.1), (m) “I find it easy to work and learn” (3.4 ± 0.1), and (d) “I work at my pace” (3.6 ± 0.1). This last Likert item recorded the consistently highest annual mean scores. There was less group work occurring over time with the reduction of the mean for: (e) “I do group work activities” from the first year (3.5 ± 0.1) to third year (2.9 ± 0.1). The third year mean scores are shown for students who consistently ticked the options of *rarely* and *never* for Item One: (g) “I find the activities challenging” (2.8 ± 0.1), (k) “I create reports on my investigations” (2.8 ± 0.1), and (h) “I am really interested in the activities” (2.9 ± 0.1). These three Likert items recorded the lowest annual mean scores for Item One of the questionnaire.

Table 5.3
Cohort B Student Participants Classroom Experiences Annual Mean Scores: Item One of Questionnaire

Learning Statements (Cohort B: N = 136)	First Year Mean (SEM)	Second Year Mean (SEM)	Third Year Mean (SEM)
(a) I do activities to investigate the real world	3.1 (0.07)	3.1 (0.06)	3.2 (0.05)
(b) I access up-to-date information for my work	3.4 (0.06)	3.4 (0.06)	3.5 (0.06)
(c) I help decide how to do an activity	3.2 (0.07)	3.0 (0.07)	2.9 (0.06)
(d) I work at my own pace	3.6 (0.06)	3.6 (0.06)	3.5 (0.06)
(e) I do group work activities	3.5 (0.06)	3.2 (0.06)	2.9 (0.06)
(f) I am assessed on the activities I do rather than just tests	3.2 (0.07)	3.1 (0.07)	3.1 (0.06)
(g) I find the activities challenging	2.8 (0.06)	2.9 (0.06)	2.8 (0.05)
(h) I am really interested in the activities	3.0 (0.07)	2.8 (0.06)	2.9 (0.05)
(i) I find and use information about a problem or task	3.4 (0.06)	3.3 (0.06)	3.4 (0.06)
(j) I analyse information to make decisions in activities	3.2 (0.07)	3.2 (0.06)	3.2 (0.06)
(k) I create reports on my investigations	2.7 (0.08)	2.7 (0.07)	3.0 (0.07)
(l) I am given help to learn in the best way for me	3.2 (0.07)	3.0 (0.07)	3.0 (0.07)
(m)I find it easy to work and learn	3.5 (0.07)	3.4 (0.06)	3.4 (0.06)

Further analysis of the data was conducted for Item One, where an Independent Samples t-test of difference was conducted for Cohort A and Cohort B. Table 5.4 demonstrates this procedure and shows where a difference of statistical significance occurs.

Table 5.4
Independent Sample t-Test for Difference in Mean Responses Between Cohort A and Cohort B: Item One

Item One	Mean difference	Std. Error diff.	t	df	Sig. (2-tailed)
(a) I do activities to investigate the real world	.045	.070	.636	244.1	.525
(b) I access up-to-date information for my work	.077	.060	1.273	290.3	.204
(c) I help decide how to do an activity	-.157	.071	-2.216	273.9	.027
(d) I work at my own pace	.058	.055	1.066	339.5	.287
(e) I do group work activities	-.017	.064	-.267	309.0	.790
(f) I am assessed on the activities I do rather than just tests	-.019	.069	-.271	294.8	.787
(g) I find the activities challenging	-.053	.068	-.782	256.2	.435
(h) I am really interested in the activities	.507	.062	8.136	315.9	.000**
(i) I find and use information about a problem or task	.074	.061	1.197	295.7	.232
(j) I analyse information to make decisions in activities	.073	.067	1.092	277.4	.276
(k) I create reports on my investigations	-.153	.077	-1.996	300.1	.047
(l) I am given help to learn in the best way for me	.213	.072	2.947	293.3	.003**
(m) I find it easy to work and learn	.134	.062	2.151	305.8	.032

Note. This table considers the differences between the overall means for November 2010 (first year) to November 2012 (third year), for Cohort A and Cohort B. ** Indicates significance at the $p < 0.01$ level.

The analysis of the data confirmed that for two of the 13 student learning statements: Item One (h) “I am really interested in the activities” and (l) “I am given help to learn the best way for me” there were statistically significant differences in the mean responses between the two cohorts. Figure 5.5 and Figure 5.6 demonstrate a difference between mean scores for Cohort A and Cohort B. These two differences in mean score between the Cohorts was statistically significant in each case (Ind. Samples t-test, $p < 0.01$). These differences between the cohorts, specifically relate to research question four – differences between junior and middle school implementation.

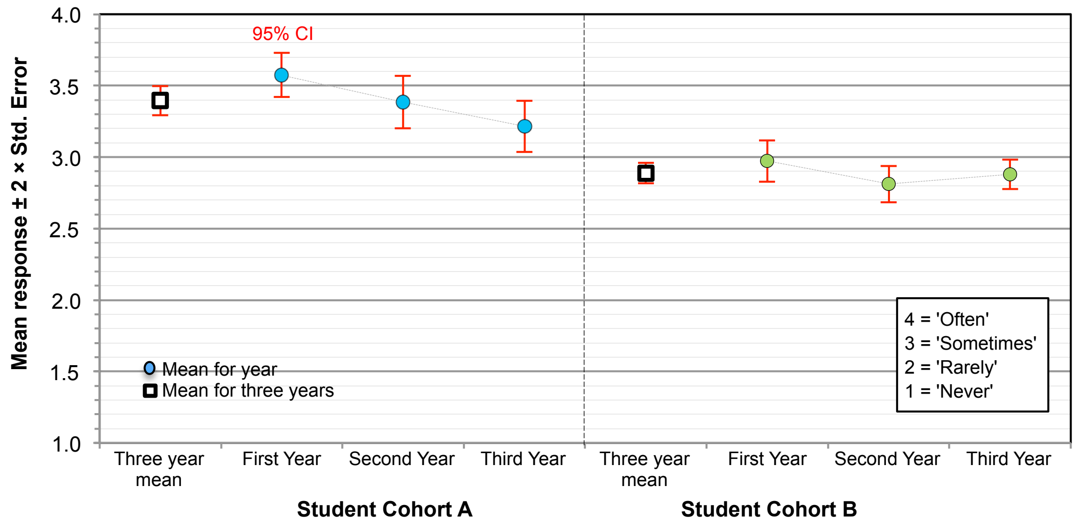


Figure 5.5. **Mean responses by students to Item one (h) I am really interested in the activities for Cohort A and Cohort B.**

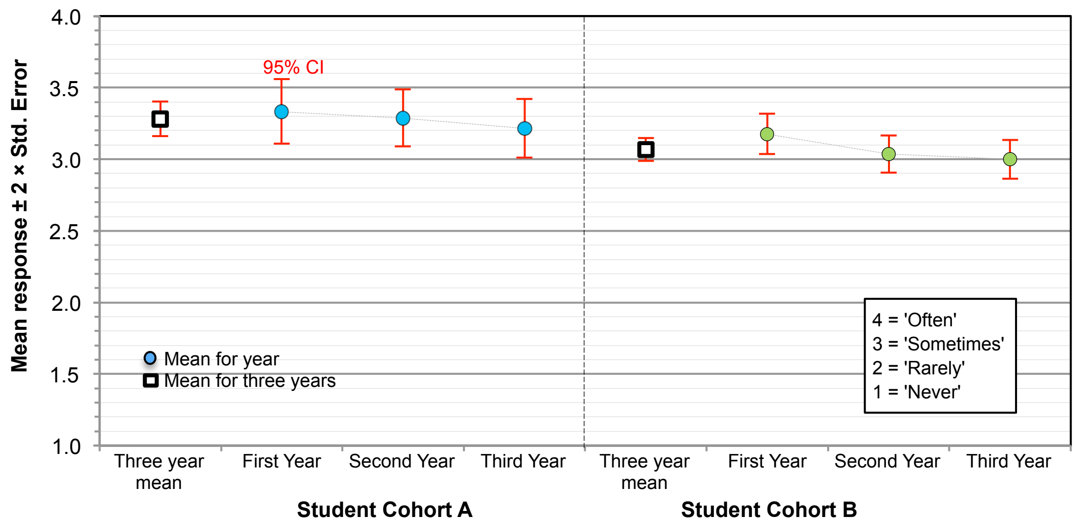


Figure 5.6. **Mean responses by students to Item one (l) I am given help to learn in the best way for me for Cohort A and Cohort B.**

Possible reasons for Cohort A having greater interest in activities may have been due to the fact that there were higher levels of differentiation, greater levels of learning engagement, and the stability of being in predominately in a single classroom. A possible reason for the student perception that they were given more help in Junior School than Middle School could be teachers in a junior setting spend more time with their students, and subsequently may be better equipped to support the needs of junior students. This will be discussed further in Chapter Nine.

5.2.4 Time spent using laptops: First year to third year

The effective use of laptops should include questions about how much time laptops are used, and for what purposes. Spies (2010, p. 1) suggested that teachers should embrace the opportunity to use laptops for learning:

> Why I believe, we should embrace technology (including laptops) and thus use it in our classrooms … is that this generation of learners, primarily the millennials (born from 1982 to 2002) have grown up with technology and use it as a primary method of learning.

The annual questionnaire recorded consistent data in relation to how much time students reported using their laptops from inception to the third year. Item Four of the questionnaire required student participants to report the amount of time they used laptops at school for each day of the week. These were in the form of five Likert items, part of a Likert-type scale: 1 *(less than 30 minutes)*, 2 *(30 minutes)*, 3 *(one hour)*, 4 *(two to three hours)* and 5 *(more than 3 hours)*. Students from both cohorts reported using laptops between the *one hour* to *two to three hour* options. In the third year, there was a sharp rise in the mean score from 3.1 ± 0.1 to 3.7 ± 0.1, which was statistically significant. (One-Way ANOVA, $p < 0.01$). This increase could suggest a possible link associated with laptop use and the transition from junior to middle school (see Figure 5.7).

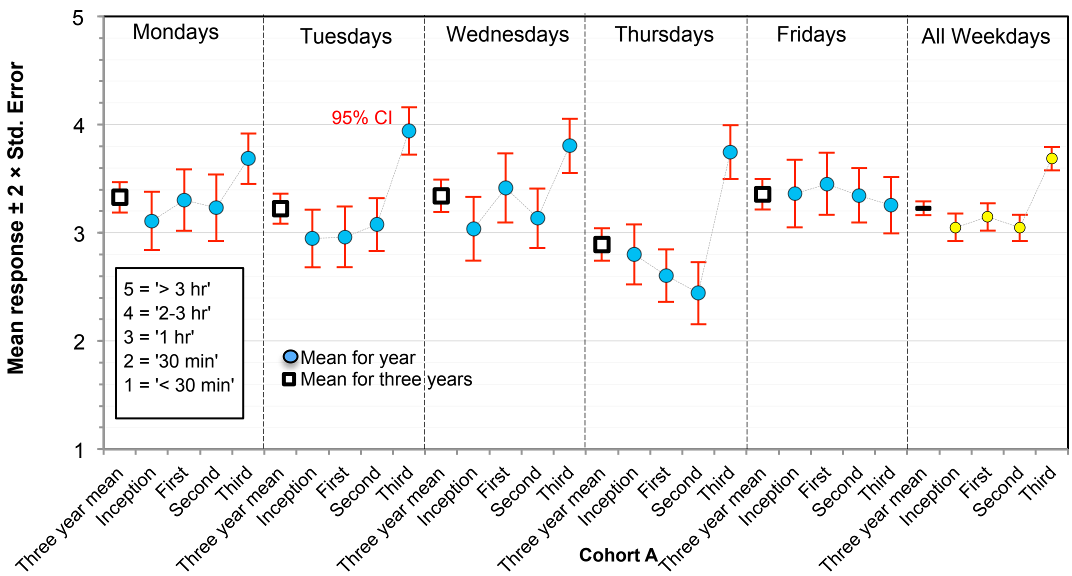


***Figure 5.7.* Estimated time spent using a laptop at school (resolved by day of week) - Cohort A.**

The middle school learning load compared to a junior school learning load increased over the study. This increase was noted by four students in Cohort A:

> Over the last 12 months, I've used my laptop mainly for schoolwork and homework at home. Sometimes it is just though looking something up on the Internet but we use it quite a lot at school for schoolwork, a couple of hours a day roughly. Homework is about roughly an hour to two hours at home and it is just Internet for that, looking up, you know, researching for assignments and stuff like that. There is definitely a lot more work in the middle school than the junior school. (A052012).

Cohort B demonstrated a fluctuating mean score for the amount of time spent using laptops. The mean score increased significantly from the first year (3.4 ± 0.1) to third year (3.7 ± 0.1); (One-Way ANOVA, $p < 0.01$). Mean scores for Cohort B are shown in Figure 5.8.

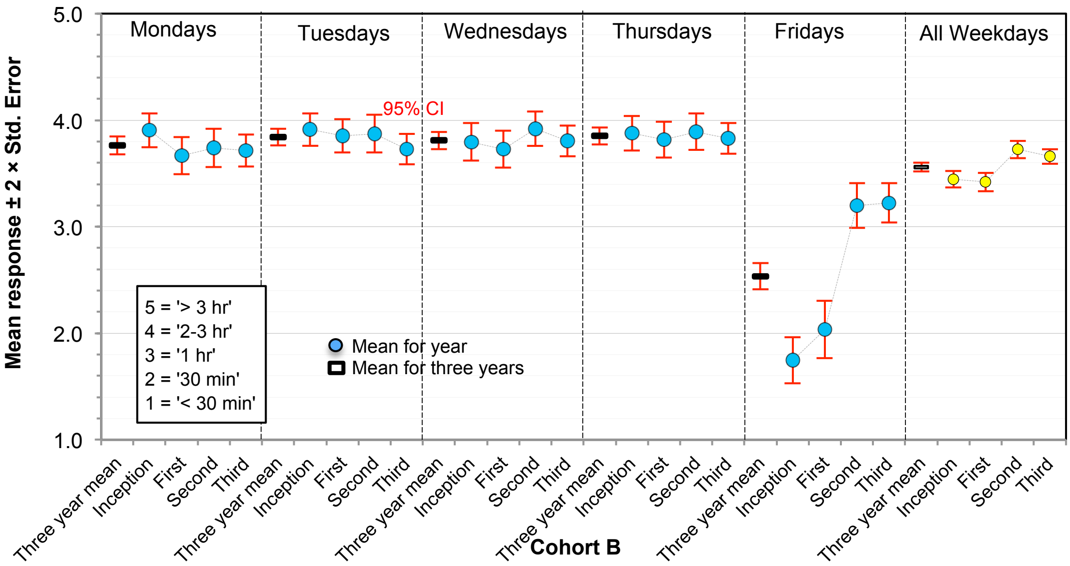


***Figure 5.8.* Estimated time spent using a laptop at school (resolved by day of the week) – Cohort B.**

Consistent with the questionnaire at the beginning of the 1:1 laptop program, students from both cohorts were using their laptops more than one hour a day. The overall three year mean score for Cohort B (3.6 ± 0.1) was higher than Cohort A (3.2 ± 0.1); (Ind. Samples t-test, $p < 0.01$). As discussed in Chapter Four, the reported laptop use in time by students was consistent with the views of teachers.

5.2.5 Laptop use outside of school.

Students from Cohort A and Cohort B were asked to respond to Item Three (h): "I use a laptop outside of school." A Likert-type scale of 1 *(never)*, 2 *(rarely)*, 3 *(sometimes)*, and 4 *(often)* was used. The three year mean score for students in Cohort A was 3.5 ± 0.1 and 3.8 ± 0.1 for Cohort B; significantly different (Ind. Samples t-test, $p < 0.01$. Figure 5.9 presents the mean scores for laptop use outside of school being mainly between the options of *sometimes* to *often.*

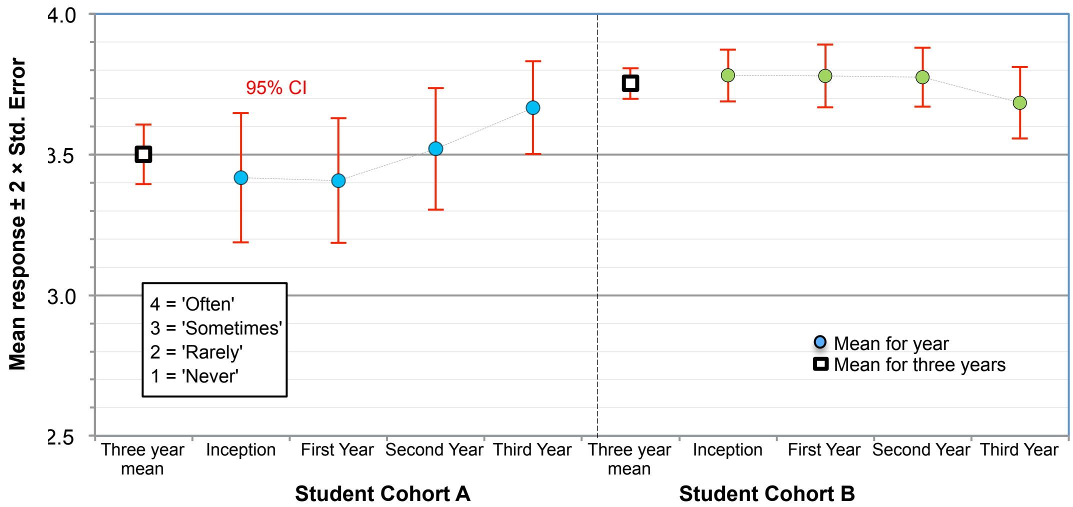


Figure 5.9. **Mean responses by students to Item three (h): I use a laptop outside of school.**

Item 14 of the annual questionnaire required students to indicate how they used their laptops at home. Item 14 was similar to those questions posed to students across Australia in the Australian Communications and Media Authority (ACMA) CyberSmart initiative (ACMA, 2013). Item 14 consisted of eight Likert items, part of a Likert-type scale: 1 *(never)*, 2 *(once a month)*, 3 *(every two weeks)*, 4 *(two to three times* a week*)* and 5 *(everyday)*. Table 5.5 presents the mean scores for each year and an overall mean for both cohorts.

Table 5.5
Student Laptop Use at Home: Cohort A and Cohort B

Laptop Use	First Year Mean (SEM)		Second Year Mean (SEM)		Third Year Mean (SEM)		Three Year Mean (SEM)	
	Cohort A	Cohort B	Cohort A	Cohort B	Cohort A	Cohort B	Cohort A	Cohort B
(a) Surfing the web	4.0 (0.15)	4.7 (0.07)	4.5 (0.10)	4.7 (0.06)	4.5 (0.12)	4.7 (0.07)	4.3 (0.07)	4.7 (0.04)
(b) Emails	3.1 (0.15)	3.1 (0.11)	3.2 (0.15)	3.3 (0.10)	3.7 (0.14)	3.5 (0.09)	3.3 (0.09)	3.3 (0.06)
(c) Instant messaging/MSN	1.4 (0.13)	3.0 (0.15)	1.8 (0.18)	2.7 (0.15)	2.7 (0.21)	2.8 (0.15)	2.0 (0.11)	2.8 (0.09)
(d) Webcam chatting	1.5 (0.13)	2.6 (0.14)	1.8 (0.16)	2.8 (0.13)	2.1 (0.19)	2.5 (0.12)	1.8 (0.09)	2.6 (0.07)
(e) Social networking (e.g. Facebook)	1.6 (0.17)	3.5 (0.15)	2.3 (0.21)	3.9 (0.14)	2.5 (0.22)	4.2 (0.11)	2.1 (0.12)	3.9 (0.08)
(f) Watching and sharing information	2.7 (0.18)	3.7 (0.11)	3.0 (0.19)	4.0 (0.09)	3.7 (0.16)	4.1 (0.10)	3.1 (0.11)	3.9 (0.06)
(g) Word processing/Power Point	4.2 (0.11)	4.4 (0.08)	4.1 (0.12)	4.3 (0.08)	4.2 (0.13)	4.2 (0.08)	4.2 (0.07)	4.3 (0.05)
(h) Playing games	3.1 (0.14)	3.3 (0.11)	3.2 (0.19)	3.0 (0.12)	2.9 (0.19)	2.6 (0.11)	3.1 (0.10)	2.9 (0.07)

The data suggest that Cohort A students increased their use of laptops over time for communication and exploration purposes. It is interesting that Cohort A in the Third Year exhibited a lower mean than Cohort B in Year One of the study. Although both of these statistics represent Year Seven, Cohort A in their third year had a more lukewarm attitude towards social networking tools possibly due to the tools becoming less attractive as they were implemented.

An independent samples test (t-test) was conducted for Item 14 to determine if there were any significant differences between Cohort A and Cohort B. Of the eight Likert items, differences between mean scores for five Items were statistically significant at the $p < 0.01$ level, as shown in Table 5.6.

Table 5.6

Independent Samples t-Test for Item 14

Item 14 – Laptop use at home	t-test for equality of means				
	Mean difference [Cohort A] - [Cohort B]	Std. Error Difference	t	df	Sig. (2-tailed)
(a) Surfing the web	-.360	.083	4.354	243.8	.000**
(b) Emails	-.031	.105	.300	295.6	.764
(c) Instant messaging/MSN	-.889	.140	6.332	356.9	.000**
(d) Webcam chatting	-.810	.119	6.779	347.1	.000**
(e) Social networking-Facebook or Myspace	-1.775	.144	12.366	293.4	.000**
(f) Watching and sharing information-YouTube etc.	-.812	.122	6.643	256.9	.000**
(g) Word processing/PowerPoint/Keynote	-.100	.083	1.213	292.6	.226
(h) Playing games	.175	.121	-1.446	297.3	.149

Note. If Sig. < 0.01, the difference is said to be significant at the p < 0.01 level (also denoted with '**'). If Sig. < 0.05 only, the difference is said to be significant at the p < 0.05 level (also denoted with '*').

The following section discusses the mean as an overall three year mean. Item 14 (a): "Surfing the web" recorded the highest three year mean for both Cohort A (3.7 ± 0.1) and Cohort B (4.7 ± 0.1). Cohort A recorded a mean of 2.0 ± 0.2 and Cohort B recorded a mean of 2.8 ± 0.2 for Item 14 (c): "Instant messaging/MSN". Item 14 (d): "Web chatting" Cohort A (1.8 ± 0.2), and Cohort B (2.6 ± 0.1). There were increases between the first year and third year of the reported use of Item 14 (e): 'social networking' for both cohorts. The mean score for Cohort A increased by 0.8 (1.6 ± 0.1 to 2.4 ± 0.1) and Cohort B also increased by 0.7 from the first year to the third year (3.4 ± 0.1 to 4.1 ± 0.1). Both of these increases indicate the use of social media rose quickly over the study. Item 14 (f): "Watching and sharing information" recorded a three year mean of 3.1 ± 0.1 for Cohort A and 3.9 ± 0.1 for Cohort B. Clearly, students from Cohort B were more attracted to the Web and social media. These themes will be further discussed in the Communicating with ICT and ethics, issues and ICT sections of this chapter.

The 30 student participants selected for the qualitative interviewing were asked the following question (18): "If you use your laptop outside of school how do you use it?" The total coded responses listed indicated that laptops were being used for:

homework and assignments (66), social media (34), searching the Internet (19), playing computer games (16) and listening to music (12). The following examples attest to the high number of responses for homework and assignments:

> Well, I don't really use it much out of school. I usually use it for homework, researching or just doing spelling, things like that. Sometimes I might go on a game for half an hour or so just to have a bit of fun. (A032010)

> I mainly use my laptop for homework accessing the Internet, communicating with my friends by Facebook and accessing You Tube. But predominantly I am using it for homework purposes because the work is increasing from subject to subject each year. (B222012)

Of the 30 students, five from Cohort A and six from Cohort B reported not using laptops for playing computer games at home. These 11 students preferred using specific gaming devices such as Xbox, Wii, PlayStation, DS and PSP:

> I think a major factor is that people aren't really interested in gaming on their laptop as much. People are more into devices like the Xbox or PlayStation and the laptop's just becoming more and more just a school thing and then when they get home, that's when it starts. (Gaming Forum 5 Cohort B 2012)

The use of laptops at home was predominantly for completing assignments and homework. Students also used their laptops for communication purposes and using the Internet. It also emerged that students preferred using gaming devices other than their laptops to play games. This preference is consistent with data analysis presented in Table 5.5 which shows a reduction in the use of the laptop for playing games in both cohorts. Figure 5.10 displays the three year pooled response frequencies of students' responses for Item 22, specifying the type of game console owned.

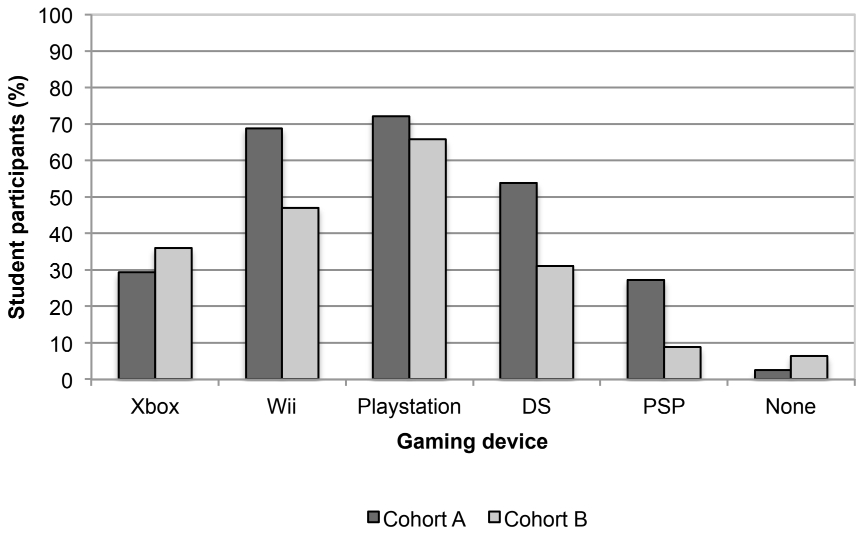


Figure 5.10. **Types of gaming consoles owned by student participants.**

5.2.6 Types of laptop uses at school

Item Two required students to respond to the 14 Likert items, part of a Likert-type scale: 1 *(never)*, 2 *(rarely)*, 3 *(sometimes)* and 4 *(often)*. These 14 items will be categorised and discussed across the five organising elements of the framework: Managing and operating ICT, Applying social and ethical protocols and practices when using ICT, Investigating with ICT, Creating with ICT, and Communicating with ICT.

5.3 Managing and Operating ICT

5.3.1 Types of software applications used

Item Nine of the annual questionnaire invited students to list software used at the School. Both cohorts reported using similar types for learning. Google recorded the highest response from both Cohort A (n = 29) and Cohort B (n = 82). It was interesting the respondents considered Google, a Web search engine, a program or an application. Pages, Keynote and Numbers were the three programs from the Apple iWork package installed on student laptops registering the highest response for both cohorts. Notably the Adobe Suite of software was the fourth most mentioned type of software; however, predominately used with Cohort B. Recorded frequencies from the student participants for the programs and applications used are shown in Figure

5.11. Caution is required in this instance as students may have been unable to reliably name the software program or application in all instances.

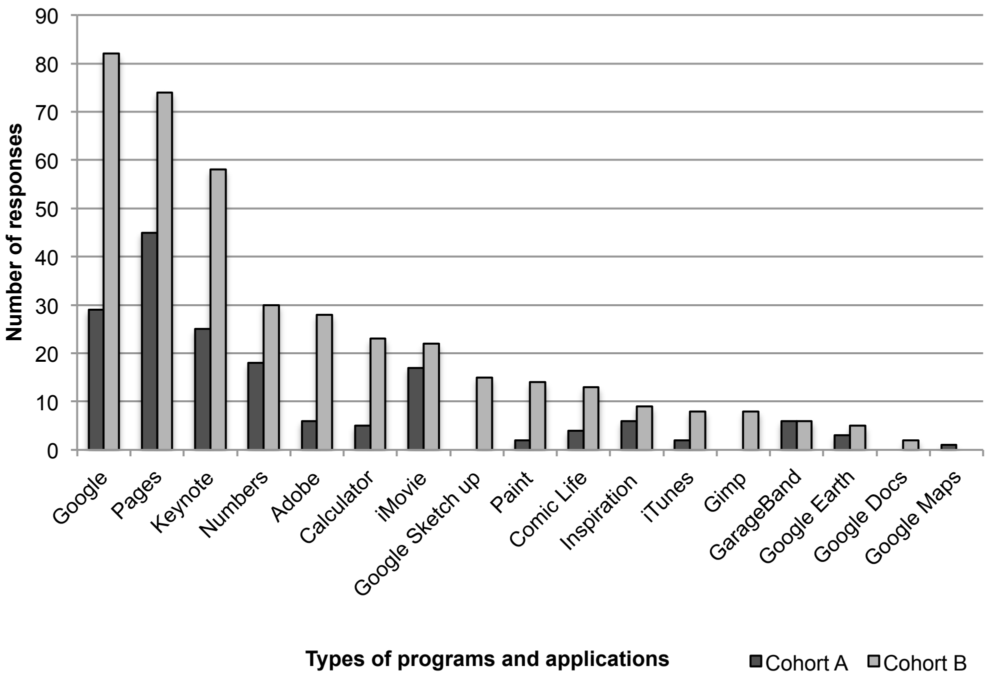


***Figure 5.11.* Student participants' coded responses to Item Eight of the annual questionnaire: Listed software used at the School.**

5.3.2 Operational skill areas

Item Eight of the questionnaire required student participants to indicate their level of proficiency for 11 skill areas as seen in Figure 5.12 and Figure 5.13. As in Chapter Four, the study was interested in the options of *advanced* and *competent use*. This is of most interest under the structure set in place where student participants were able to select multiple answers: 1 *(none)*, 2 *(basic)*, 3 *(competent)*, and 4 *(advanced)*.

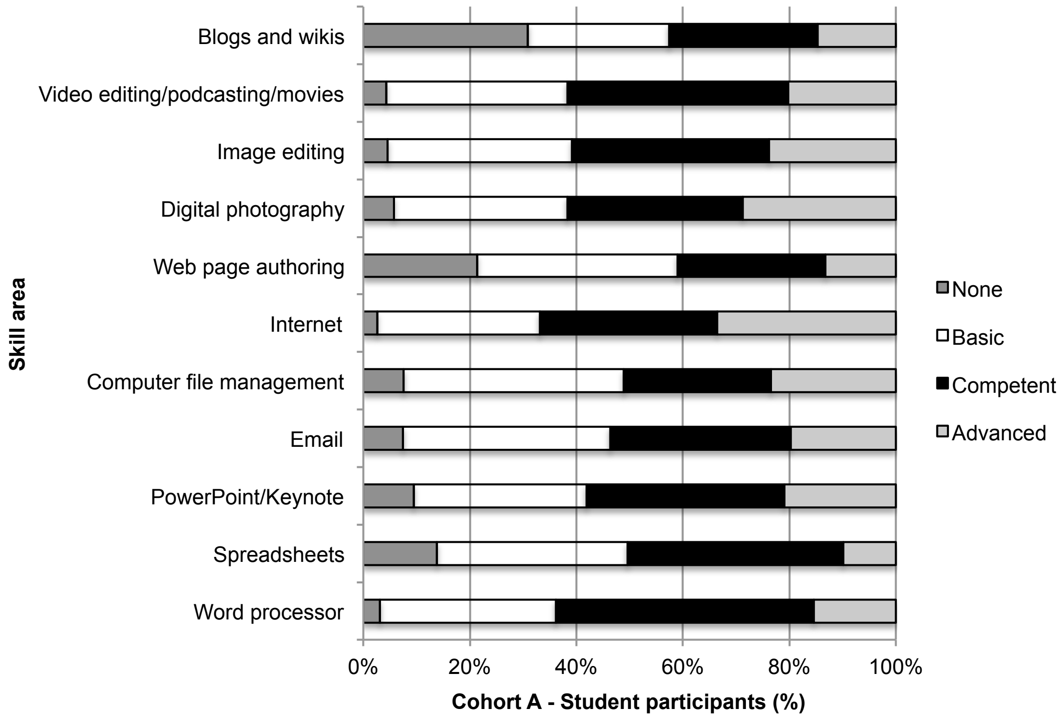


Figure 5.12. **Cohort A three year pooled frequencies of responses for ICT competencies using laptops.**

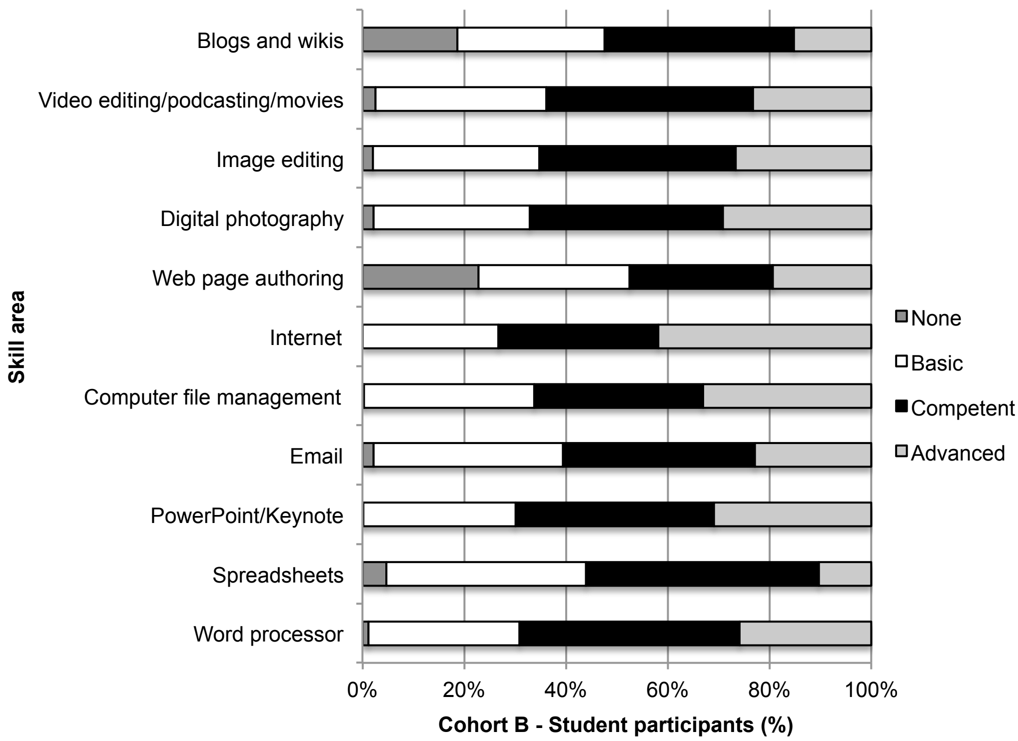


Figure 5.13. **Cohort B three year pooled frequencies of responses for ICT competencies using laptops.**

As both cohorts progressed through their respective school year levels, the levels of proficiency increased. A higher proportion of Cohort B (43.6%) compared to Cohort A (33.0%) students had ticked the *advanced* option across the 11 items. There was an increase from the first year to the third year in the lowest option of *none* for both Cohort A and Cohort B for the items of "web page authoring" (Cohort A = 13.6 and Cohort B = 15.5 percentage points) and "blogs and wikis" (Cohort A = 13.5 and Cohort B = 35.9 percentage points). This result validates the data collected from both the questionnaires and the interviews, as there were limited references about these two competencies. Overall, both cohorts could be considered as *competent* in the 11 competencies.

With the apparent decrease in competencies of 'blogs and wikis' and 'web page authoring', an inference could be made about the infrequent use of these tools in mainstream classes. Additionally, these skills could have decreased due to the rise of other avenues for expression, especially social networking sites such as Facebook. These types of ICT competencies were mainly found in specialised ICT subject areas. Two teacher participants who were interviewed, and taught the subject Applied Information Technology (AIT), shared examples of the type of skills students would complete in this subject area:

Q: **What are the main purposes for you to use ICT with your students?**

A: We do a lot of focus on website designing, as well, so either designing whether it be in image manipulation so using programs like Photoshop, Illustrator, Fireworks Flash, they're probably the core things. (C502010I)

This dialogue provided an example of when these tasks, classified as operating with ICT, could also be considered as creating with ICT. The two participants mentioned the use of wikis and web design in their interviews:

> There's a couple of ways we use the laptops, the first way is pretty much the delivery of content, particularly from electronic wikis. So in many ways it's more of a tool to facilitate learning as opposed to a way to learn itself though it depends on what kind of software we do use. (C702011)

> The full Adobe Suite we use all the way across. Photoshop's probably the one that gets hit every year but Dreamweaver gets hit most years. We're doing After Effects in Year 9 and 10 as well, so yeah, across all year groups we're hitting them all but predominantly Dreamweaver, Photoshop, Flash. (C642012)

All of the mentioned ICT competencies in one form or another have the capacity for use in one or more of the five organising elements of the ICT capability learning continuum. However, it is dependent on the approach a teacher takes to enable a student to use a laptop for learning. Three students commented that teachers had slowly shifted to using laptops:

> Like, first, teachers probably prefer to use the books and now they are kind of seeing it is probably easier to use the laptops, a bit more organised, a lot less papers around and stuff. (B222012)

With this perceived shift the opportunity to develop skills and learn new approaches could be seen as important for learning with laptops. Chapter Seven discusses the extent to which these learning opportunities and impacts occurred.

5.3.3 Challenges and difficulties faced using a laptop

Providing students with a laptop for learning presents a range of opportunities and challenges for schools (Linvingstone, 2012). Question Nine of the annual interview asked: “What challenges, if any, have you faced using the laptop each day?” Students from both cohorts reported the following types of challenges: authentication and connectivity, backing up, battery life, Internet, new platform and programs, reduced performance and resisting distraction. Figure 5.14 provides a radar graph distribution of the total coded responses made by student participants about these challenges between the first year and third year. The further the line to the outer point of the radar graph indicates a higher frequency of reported cases of a challenge.

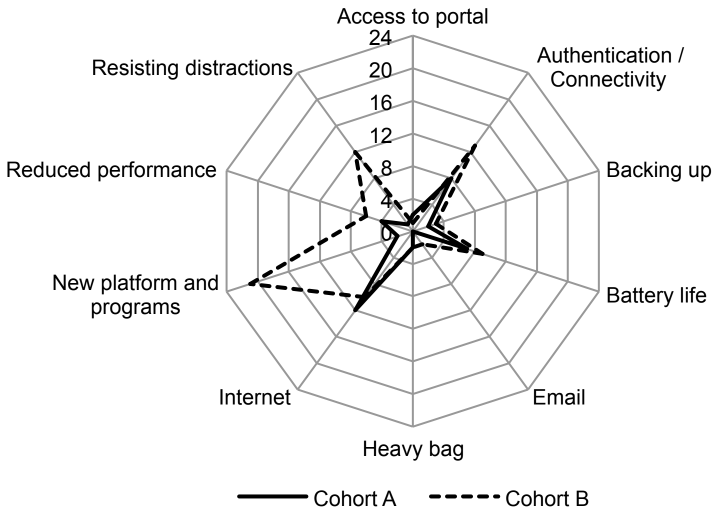


Figure 5.14. **Coded responses for challenges faced by student participants using laptops.**

The difference seen between Cohort A and Cohort B for new platform and programs is interesting. Twenty one students from Cohort B reported experiencing difficulties with the new platform and software. These were consistent with the following comments:

> Well, sometimes they ask us, some teachers ask us to do something that we, that I don't know, like, because I've been using a PC most of my life, not a Mac, so I don't know all the features on there. (B232010I)

> …it's really hard to know all the stuff on it, it's really hard to get; a couple of kids know how to do it really well, but I struggle really bad with it. ICT, I'm pretty good with it, but it's mainly based on Microsoft Word which means they don't have all the same stuff on Mac as they do on Microsoft. (B252010)

Students had previously used PCs, and in the change of platforms the main cause of difficulty was the change from PC to Apple.

Authentication and connectivity was a challenge faced by half of the students (Cohort A = 5 and Cohort B = 10). During the first year and second year of the study, students (Cohort A = 7 and Cohort B = 8) experienced difficulties connecting to the Internet. Students (Cohort A = 5 and Cohort B = 8) reported in the third year, their laptops having issues related to battery life and the declining performance of the laptop (Cohort A = 3 and Cohort B = 5). Seven students from Cohort B indicated they faced distractions when using laptops, with one reported case from Cohort A. Table 5.7 provides examples of the challenges reported by the students.

Table 5.7
Student Responses to the Challenges Faced Daily Using Laptops

Challenge	Participant
Access to portal	The only thing is that with laptops they're really good but sometimes it's just the portal, the web shutting down at school and that kind of thing can be a problem but apart from that it's all pretty good. (B212010)
Authentication and connectivity	The time it takes to connect to the Internet because you have to change your location, then you have to sign in to the school Internet, and then it asks you to sign in again and you have to do that multiple times and then when you get onto the Internet ask for a Blue Reef login. So there's quite a lot of logins to be able to access the Internet at school. (B272011)
Backing up	Well, mainly backing up. I've had troubles with that, and I would like to know more. (B302010I)
Battery life	One of the challenges is the battery life because, it says it should last about seven hours, but when I charge it I don't turn it off and charge it, I just close the lid and charge it and when I do that I probably only get three hours out of it, three and a half hours. (B122010)
Email	Not all the time but a little bit of the time, emailing, but just some of the time. (B272010)
Heavy bag	It's heavy to take to school because your back gets sore after a while having a heavy bag. (A042012)
Internet	Internet, like, if the Internet's down it kind of gets frustrating when it's not up, because then you can't do your work, and you really want to get onto it. (A082011)
New platform and programs	Well, the Mac is completely different so changing some things are hard and ... yeah. But I've gotten used to it now. (B222010)
	Mainly just getting used to it and kind of, like, teaching my family to get used to it. (B192010I)
Reduced performance	The first year I found the laptops really good and there wasn't a lot of problems and now, as they're beginning to get a bit old, might have been because I wasn't taking special care with it. When it's loading, if you move anything you have to go into the rainbow spinning wheel and then you have to force quit the whole program. (A012012)
Resisting distraction	Resisting the temptation to do other things than work really. (B232010)

5.3.4 Levels of support

As discussed in Chapter Four, the School is well resourced for the provision of ICT support. Access to an ICT support centre was provided to students to resolve or rectify their ICT issues. Question 27 of the annual interview required students to respond to: "How do your parents help with your laptops?" Both cohorts indicated a limited level of parental support with their laptops. Nine students (Cohort A = 5 and

Cohort B = 4) identified their parents attempted to help them, but it was related more to the actual task, rather than the use of the laptop:

> They don't really like my laptop because they're used to Windows so sometimes they get a bit frustrated at the different applications, and they don't really know what to do. But, they help me when I'm trying to find a website, and they somehow find a really good website for me. And they make sure it's got lots of information. (A032011)

Five (50%) Cohort A and sixteen (80%) Cohort B students reported that parents had little understanding of the Apple platform and were unable to help. This suggests that, at home at least, students were primarily left to their own devices to resolve problems with their laptops. These data also confirmed that a 'digital divide' (in this instance, an 'Apple divide') between the parents (digital immigrants) and students (digital natives) was evident (Prensky, 2001). Most students from both Cohort A and Cohort B believed parents were not suitably experienced to help them with their laptops:

> My parents do not actually help me that much with my laptop because the era that my parents grew up in was the old PCs and DOS and stuff like that. They don't really know that much about the Macs. (B112011)

> Well, Mum and Dad, they help but they are kind of technophobes, they are not great with technology so they try their best, and they do help. (B212012)

> I find it hard to assist using an Apple Mac as I am a PC user. I struggle to see the benefit of Apple Mac for the school when PCs are used in commerce. I think the school should use the Windows PC environment for school to better prepare them for what they will use later. (Parent comment 2011 Parent Questionnaire – Cohort A)

This lack of support from parents was not due to the lack of desire, but more probably due to a perceived lack of understanding of the Apple platform. Also, many adults have only a superficial knowledge of computer operating systems and commonly used applications. This lack of understanding highlights the possible issues when implementing a non-PC platform for parents who may have limited experience in the Apple operating system for laptops, and contributes to the theme of alienation, which is discussed in Chapter Eight.

5.3.5 Attitude towards using laptops at school

Item Three of the questionnaire asked students to think about how they used laptops at school over the year and respond to eight statements. The statements were in the form of eight Likert items, part of a Likert-type scale: 1 = *Never*, 2 = *Rarely*, 3 = *Some*, and 4 = *Often*. Table 5.8 presents the mean scores and a three year mean for both cohorts.

Table 5.8
Student Laptop Use at School: Cohort A and Cohort B

Laptop Use	First Year Mean		Second Year Mean		Third Year Mean		Three Year Mean	
	Cohort A	Cohort B	Cohort A	Cohort B	Cohort A	Cohort B	Cohort A	Cohort B
Q3 (a) - I am comfortable using my laptop for class work	3.9 (0.04)	3.9 (0.03)	3.9 (0.05)	3.9 (0.04)	3.9 (0.04)	3.8 (0.04)	3.9 (0.02)	3.9 (0.02)
Q3 (b) - The work I complete using my laptop is important	3.8 (0.06)	3.7 (0.05)	3.7 (0.06)	3.6 (0.05)	3.8 (0.07)	3.6 (0.05)	3.8 (0.03)	3.6 (0.02)
Q3 (c) - The activities using laptops are interesting	3.7 (0.07)	3.5 (0.06)	3.5 (0.07)	3.3 (0.06)	3.5 (0.08)	3.2 (0.06)	3.7 (0.04)	3.4 (0.03)
Q3 (d) - Using a laptop allows me to tackle complicated activities	3.5 (0.08)	3.6 (0.06)	3.6 (0.09)	3.5 (0.06)	3.7 (0.07)	3.4 (0.06)	3.6 (0.04)	3.5 (0.03)
Q3 (e) - I make an effort to complete activities involving my laptop	3.8 (0.06)	3.7 (0.05)	3.9 (0.06)	3.6 (0.06)	3.8 (0.07)	3.5 (0.05)	3.8 (0.03)	3.7 (0.03)
Q3 (f) - I feel motivated at school when working on activities using my laptop	3.7 (0.07)	3.4 (0.07)	3.4 (0.09)	3.3 (0.07)	3.4 (0.10)	3.2 (0.06)	3.5 (0.05)	3.3 (0.04)
Q3 (g) - I am given a choice to use a laptop for school work	2.8 (0.13)	2.8 (0.08)	2.6 (0.11)	2.8 (0.07)	2.8 (0.12)	2.8 (0.07)	2.8 (0.06)	2.8 (0.04)
Q3 (h) - I use a laptop outside of school	3.4 (0.11)	3.8 (0.06)	3.5 (0.11)	3.8 (0.05)	3.7 (0.08)	3.7 (0.06)	3.5 (0.05)	3.8 (0.03)

Cohort A recorded a higher three year mean score in five of the eight possible statements. Furthermore, only four of the five were significantly higher. There were (b), (c), (e) and (f). The possible reason for Cohort A having higher mean scores could relate to greater levels of satisfaction and interest towards learning compared that of Cohort B. This notion will be discussed further in Chapter Eight (Discussion).

An independent sample test (t-test) was conducted for Item Three to determine if there were any significant differences between Cohort A and Cohort B. Of the eight Likert items, four differences of mean were statistically significant at the $p < 0.01$ level, and one at the $p < 0.05$ level, as shown in Table 5.9.

Table 5.9
Item Three Independent Samples t-Tests between Cohort A and Cohort B

Item Three	Mean Difference	Std. Error Difference	t	df	Sig. (2-tailed)
(a) I am comfortable using my laptop for class work	.011	.028	.381	409.479	.704**
(b) The work I complete using my laptop is important	-.160	.038	-4.213	482.875	.000**
(c) The activities using laptops are interesting	-.217	.046	-4.706	458.206	.000**
(d) Using a laptop allows me to tackle complicated activities	-.063	.048	-1.312	426.117	.190
(e) I make an effort to complete activities involving my laptop	-.147	.040	-3.641	474.835	.000**
(f) I feel motivated at school when working on activities using my laptop	-.184	.063	-2.926	341.777	.004*
(g) I am given a choice to use a laptop for school work	.031	.070	.449	371.417	.654
(h) I use a laptop outside of school	.253	.060	4.247	330.103	.000**

Note. If Sig. < 0.01, the difference is said to be significant at the p < 0.01 level (also denoted with '**'). If Sig. < 0.05 only, the difference is said to be significant at the p < 0.05 level (also denoted with '*').

For Item Three (b) "The work I complete using my laptop is important", the three year mean score differential between Cohort A and Cohort B was -0.16 and indicates students in Cohort B were less enthusiastic about the importance of work done on laptops (see Figure 5.15).

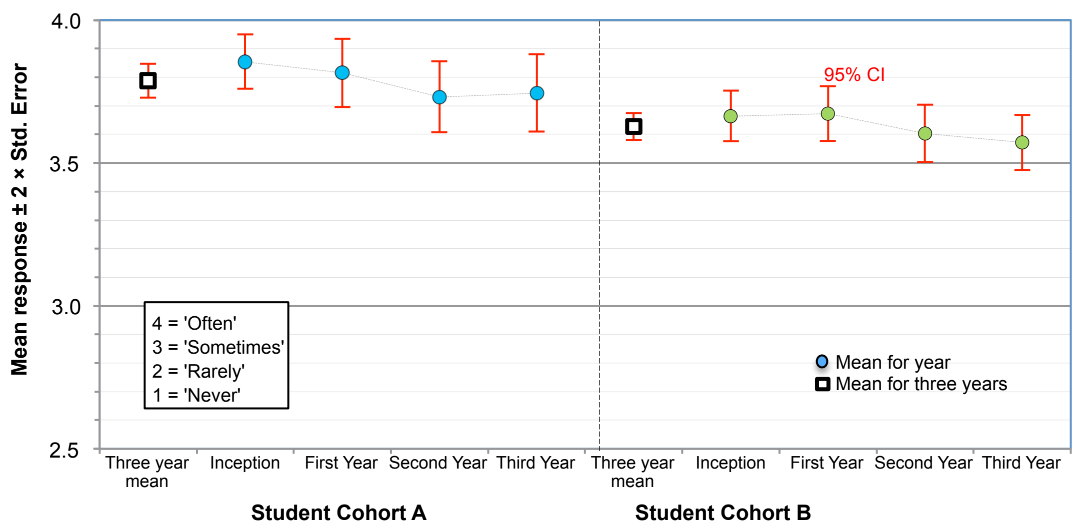


Figure 5.15. **Mean responses by students to Item three (b): The work I complete using my laptop is important.**

Both cohorts experienced a statistically significant decrease in the mean score for Item Three (c): “The activities using laptops are interesting.” The three year differential in the mean was 0.2 between Cohort A and Cohort B. The level of significance for the first year to third year was at the $p < 0.01$ level in both cases (One-Way ANOVA). Figure 5.16 shows the decline of mean scores for both cohorts and emphasises that activities on the laptops were seen to be less interesting compared to the early years of the study. This decline could be linked to the novelty factor decreasing between the first and third year of the study.

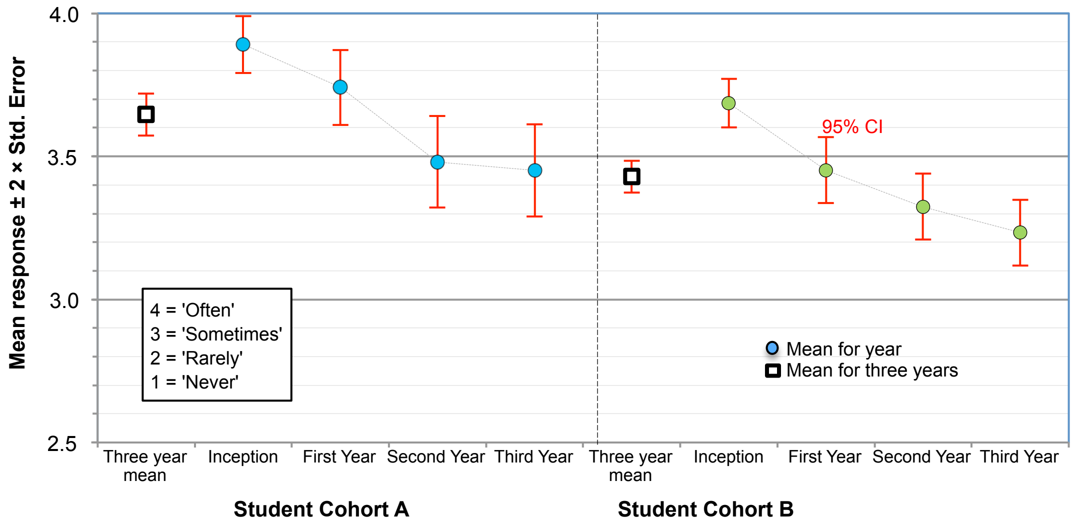


Figure 5.16. **Mean responses by students to Item three (c): The activities using the laptop are interesting.**

For Item Three (e): “I make an effort to complete activities involving my laptop”, students from Cohort B recorded a consistent decrease in mean scores each year of the study, whereas Cohort A remained stable. The first year to third year decline was significant (One-Way ANOVA, $p < 0.05$). Figure 5.17 shows the three year differential in the mean was -0.2 between Cohort A and Cohort B.

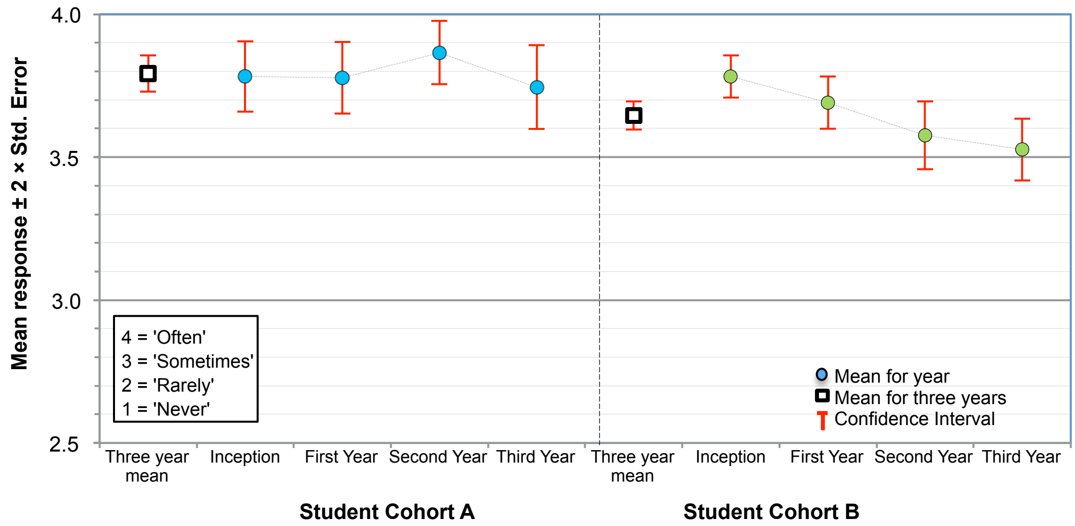


***Figure 5.17.* Mean responses by students to Item three (e): I make an effort to complete activities involving my laptop.**

Both cohorts demonstrated lower levels of motivation in the third year compared to the first year of the study in response to Item Three (f): "I feel motivated at school when working on activities using my laptop." The three year differential in mean between Cohort A and Cohort B was statistically significant (Ind. Samples t-test $p < 0.01$) at -0.18 and suggests Cohort A was more engaged at school when using a laptop than Cohort B (see Figure 5.18). For Cohort A and Cohort B, the diminution in mean response from first year to third year was significant (One-Way ANOVA, $p < 0.05$).

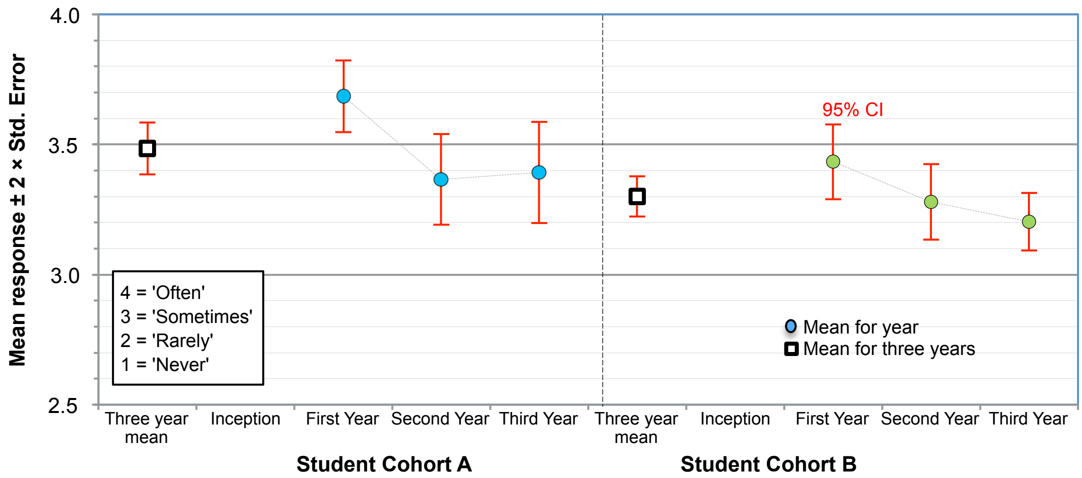


Figure 5.18. **Mean responses by students to Item three (f): I feel motivated at school when working on activities using my laptop.**

The three year mean differential between Cohort B and Cohort A was 0.3 and statistically significant (Ind. Samples t-test, $p < 0.01$). This difference indicated students in Cohort B had a higher rate of use for Item Three (h): "I use a laptop outside of school." The use of a laptop outside of school was the only one of the eight Likert items on which Cohort B recorded a significantly higher mean score than Cohort A (see Figure 5.19).

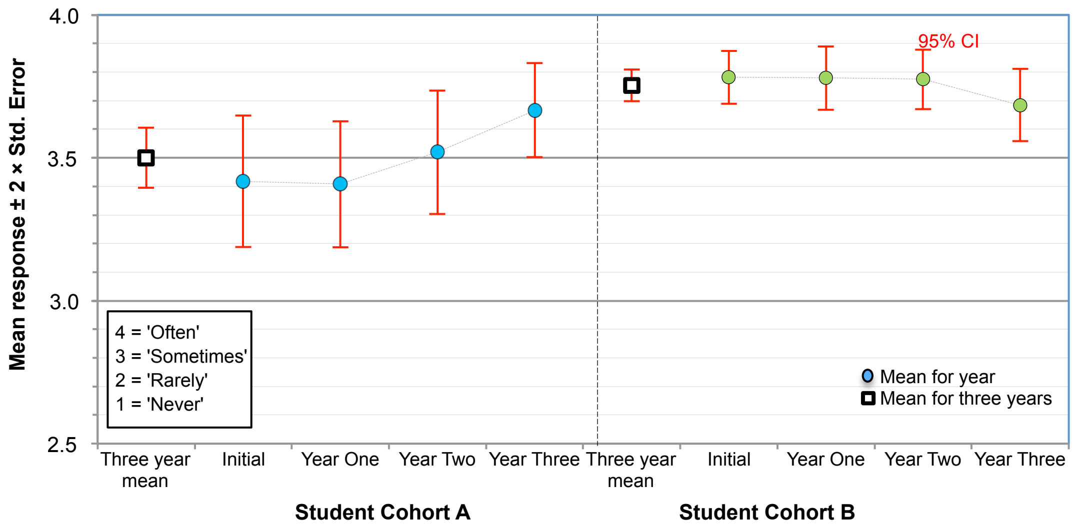


Figure 5.19. **Mean responses by students to Item three (h): I use a laptop outside of school.**

The overall message from students towards laptop use at the School was one of a slight and gradual decline in interest, effort and engagement. There were five items (a total of eight) from Item Three, which recorded a change of mean that was statistically significant (Figures 5.15 to 5.19). These findings further emphasise the importance of providing a quality learning environment through engaging and motivating lessons (McDonald, 2010).

5.4 Investigating with ICT

5.4.1 Research and Internet use.

The response of students from both Cohort A and Cohort B were concentrated in close proximity to the option *often* for Item Two: (i) “I have used the Internet to find information for my work” and (j) “I use my laptop for research” (see Figure 5.20 and Figure 5.21).

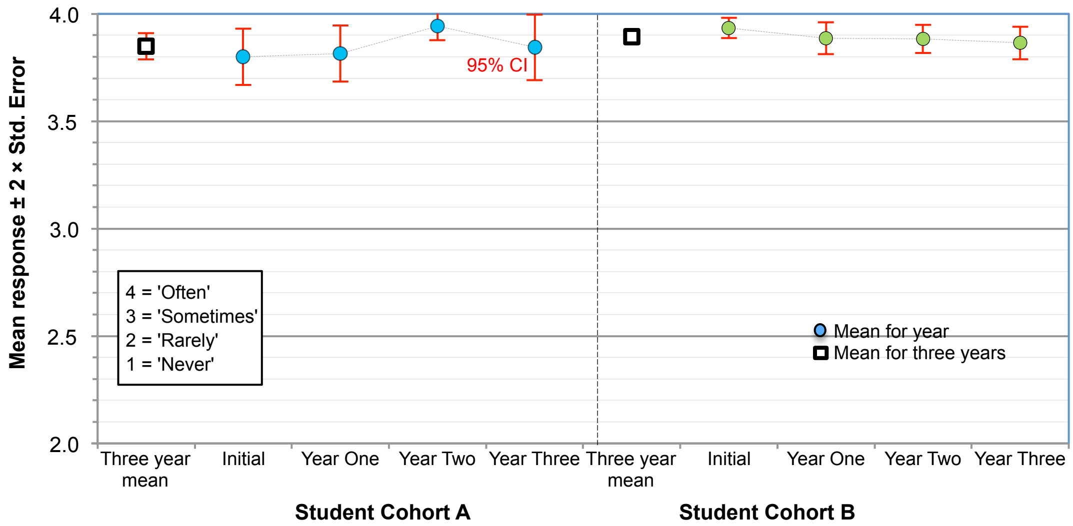


Figure 5.20. **Mean responses by students to Item two (i): I have used the Internet to find information for my work.**

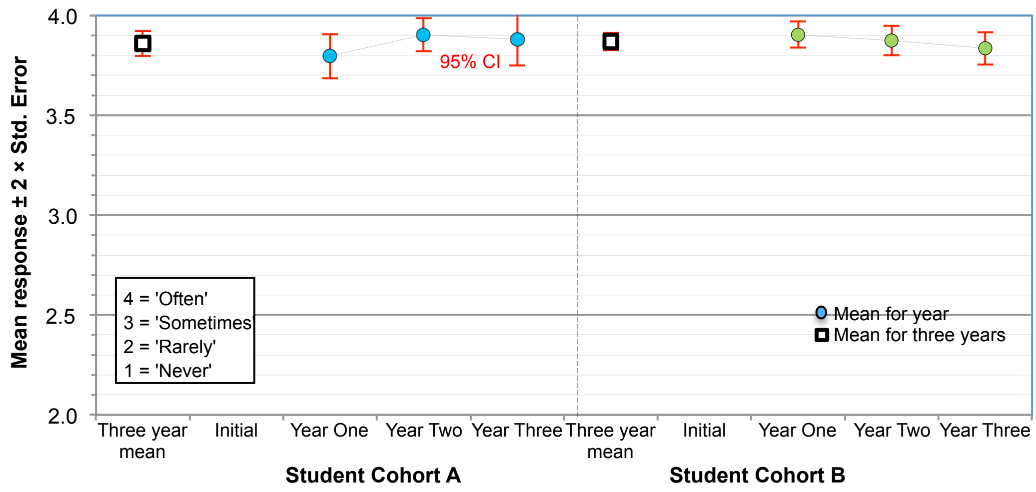


***Figure 5.21.* Mean responses by students to Item two (j): I use my laptop for research.**

Students from both cohorts predominately ticked the options of *rarely* and *sometimes* for Item Two (h): "I have used laptop programs to find information." When referring to laptop programs, these were specific pieces of software installed on laptops such as ClickView (videos on demand) and Encyclopaedia Britannica. Figure 5.22 shows both cohorts recorded a similar mean score for this Likert item.

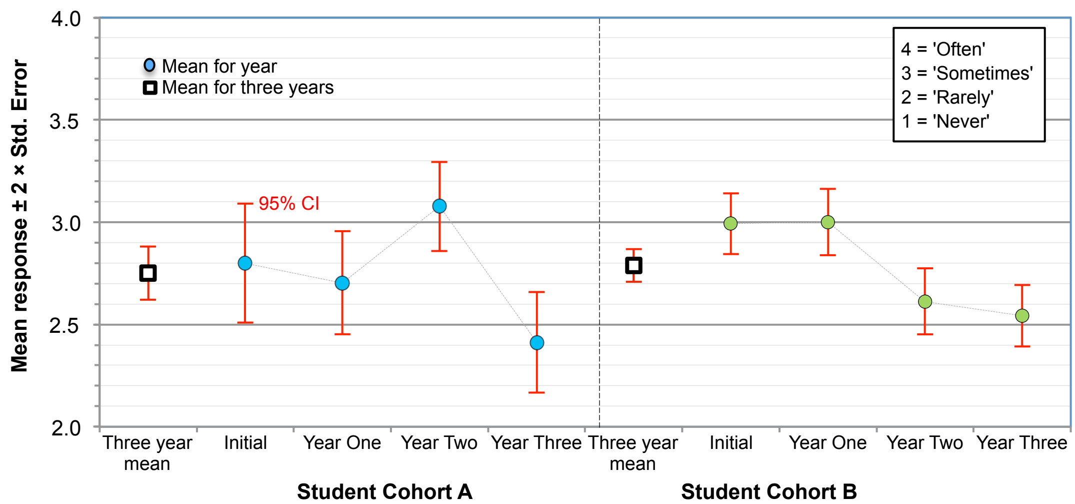


***Figure 5.22.* Mean responses by students to Item two (h): I have used laptop programs (e.g., ClickView, Encyclopaedia Britannica) to find information.**

Question two of the annual interview asked students: "How do you use your laptop for research?" For students, laptops as a research tool equated to accessing the

Internet. Seven students from Cohort A reported accessing the Internet, as did fifteen from Cohort B. Google appeared to be the first preference for nine Cohort A and fourteen Cohort B students:

> I can search up information using Google. (A062012)
>
> Well, obviously start off with a Google search on any curious topic and then there is just so many sites out there that you can find out about almost anything. (B192012)

Three students from Cohort A and four from Cohort B reported accessing Wikipedia when using laptops for research. Tools used for research included: online dictionary (Cohort A = 1 and Cohort B = 5), eBooks (Cohort A = 1 and Cohort B = 7), online atlas (Cohort A = 0 and Cohort B = 1), online encyclopedias (Cohort A = 0 and Cohort B = 1) and YouTube (Cohort A = 0 and Cohort B = 1).

Accessing authentic data to connect to the world provided opportunities for students to be self-directed in completing research related tasks. According to the examples of how students used laptops for research, an underlying theme emerged. Students tended to rely on a set of tools (mainly the unsophisticated use of Google) and this approach to research did not serve students well. All but one student did not identify reputable online encyclopedias, for example, as a way to research. Chapter Eight (Discussion) explores this theme further.

With the Internet (network) and the Web (content) being used at such regularity, and described by Soeters and van Schaik (2006, p. 35) as a ‘playground for children’, it is important to consider the possible risks associated with using the Internet. The issue of risk will be discussed in the ‘Applying social and ethical protocols and practices when using ICT’ section of this chapter.

5.4.2 Problem solving

ACARA (2013) defines problem solving using ICT as students collecting, accessing and presenting different types of data with the help of software. Both cohorts reported using their laptops for solving problems *sometimes* to *often*, for Item Two: (m) ‘I use my laptop for problem solving.’ The changes in the mean as shown in Figure 5.23 were not statistically significant.

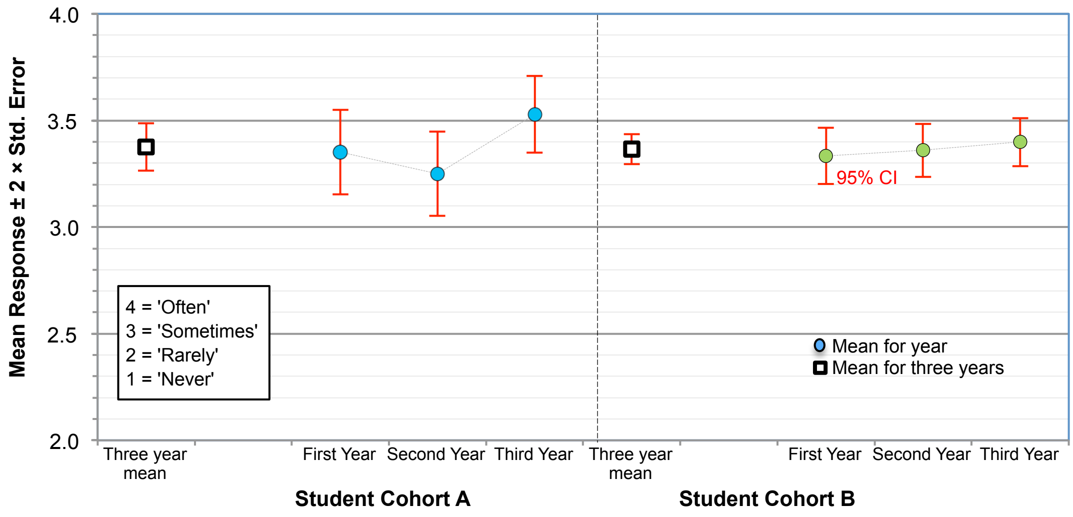


***Figure 5.23.* Mean responses by students to Item two (m): I use my laptop for solving problems.**

Question Eight of the annual interviews queried student participants: "How do you use your laptop for solving problems?" Students used a range of applications, programs, websites and desktop widgets such as calculator, dictionary, encyclopaedia, Mathletics and Pages to solve problems. The following interview excerpts provide insights into how students perceived using laptops for problem solving:

> The dictionary you can get on Dashboard, one of the widgets can be a dictionary and that is good because it is has a thesaurus in it. It is right there really and you can just find out what something means or what are some of the synonyms. (A052012)

> It is good for solving problems because it has stuff like calculators, dictionaries, encyclopaedias, just all these applications on the computer. Solving problems, like we had to make a budget for SOSE [Studies of Society and Environment] recently and on numbers there was this, one of the spreadsheets you could do was a budget thing and all you had to do was type in the numbers and it did the rest for you. (B122010)

Eight students from Cohort A and thirteen from Cohort B indicated using the Internet to solve problems had become a common occurrence. Five students from Cohort A and four from Cohort B reported using Google for problem solving:

> Well, mainly to solve problems we just basically do the most simplest things. It kind of works out in an order. I have a problem that I can work out with myself, first solution Google it. If you can't do that, go on answers.com. If that doesn't do it then basically you have to really tighten the search. It all really comes down to the www search. (B112011)

> I use the Internet a lot more now to just search up for what the problems that I have and to figure them out. (A092012)

> I like to use as many programs as I can to solve problems but generally it will come from the Internet, I search the problem I'm trying to find and the Internet will most likely have a solution for it. (B202012)

According to the responses from students from the two cohorts, they predominately used the Internet, and more specifically Google to solve everyday problems. The access for students to find information had improved since the implementation of the 1:1 laptop program. Four students from Cohort A and four from Cohort B reported it was easier to solve problems or access information with their laptops. According to student B27 the 'too hard' barrier of having to go to the library and locate a book or information had diminished. Information on demand was now the norm within the 1:1 laptop environment:

> The laptop program makes it all that much more easier. Before I would not find the time to go to the library to find information. Now there is no excuse. It is so much easier with the laptop. (B272010)

This kind of learning, where students spent time using the Internet, may have increased the amount of reading a student completes each day, without them even knowing that this was happening. With a great deal of boys' education literature available in the area of raising boys' achievement in schools (Bleach, 1998; Driessen & van Langen, 2013; Hawkes, 2001; Warrington, Younger, & Bearne, 2006), this form of digital literacy could be viewed as beneficial to the development of literacy skills in both of the cohorts. Johnson (2006) suggested that, from a developmental perspective, using the Internet and accessing websites stimulates cognitive processes involved in interpreting text and images.

Both cohorts did not demonstrate any other examples of how to use their laptops for problem solving. Common answers such as accessing applications, widgets, dictionaries, calculators and the Internet continued to be consistent responses. A pragmatic view that could be construed is that the laptop had an effective function of enabling students to access digital information on demand. Overall, a moderately low level of problem solving using laptops was observed.

5.4.3 Self directed learning

The FIT:COM teacher observation protocol used for the study and discussed in Chapter Four, provided an opportunity to observe student participants simultaneously. According to Jimoyiannis (2011), the aim of using ICT is for students to develop their independence in its use, and make learning more empowering. To investigate whether students had shown signs of progression with the use of ICT, Items Eight and Ten within the dynamics section of the FIT:COM protocol were used to verify this view. Item Eight: “Interaction with technology provided students with a sense of independent control and mastery over an environment” demonstrated a gradual progression for both Cohort A and Cohort B (a minimum score of zero or maximum score of four was possible). Cohort A recorded a higher mean score (representation of the possible score ranges) in the first year (1.7 ± 0.1) compared to Cohort B (1.5 ± 0.1). Figure 5.24 shows that by the third year, Cohort B had recorded a mean score of 2.2 ± 0.1 compared to 2.0 ± 0.1 for Cohort A. These mean scores would suggest that there were signs of a slight shift of the locus of control from the teachers to the students (a total of 30 observations took place between the first year to the third year).

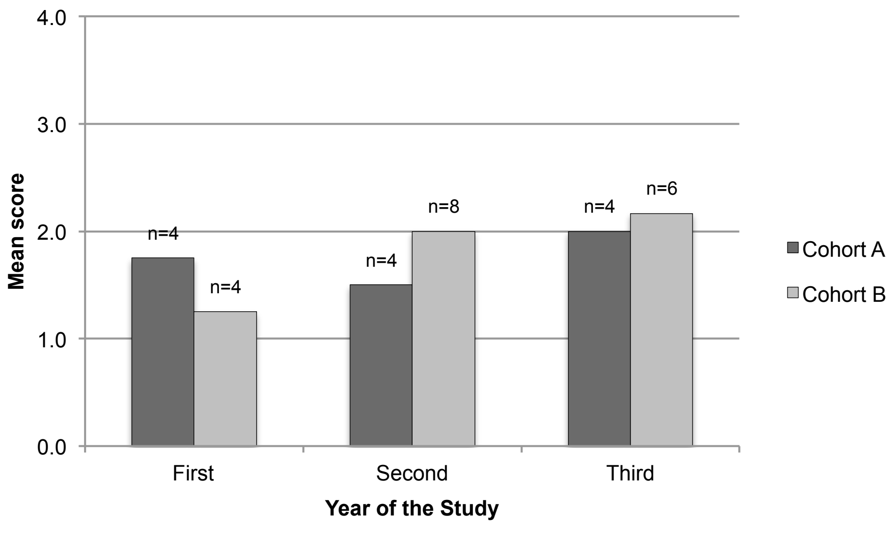


Figure 5.24. **Cohort A and Cohort B three year mean scores for interaction with technology provided students with a sense of independent control and mastery over an environment.**

Item Ten of the observation protocol: ‘Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence’, recorded higher mean scores from the first year to the third year for both cohorts. Cohort A increased from the first year (2.2 ± 0.1) to the second year (3.0 ± 0.1), then decreased in the third year (2.5 ± 0.1). This decrease in the third year may be linked to Cohort A transitioning from a junior school to middle school. Cohort B, on the other hand, demonstrated a consistent rise in the mean between the first year (1.8 ± 0.1) and third year (3.3 ± 0.1) as shown in Figure 5.25.

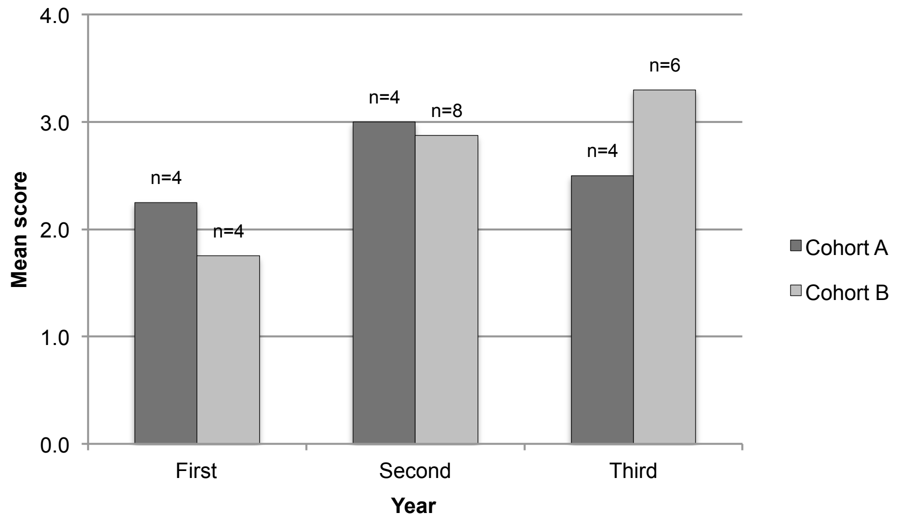


Figure 5.25. **Cohort A and Cohort B three year mean scores for students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence.**

Observations confirmed that the students were using their laptops primarily for investigating and creating with ICT. These observations are consistent with the views of the students and reinforce their beliefs that the laptops were regularly used for research, creating and completing tasks.

5.5 Creating with ICT

For each of the Likert items in Item Two, a three year mean was calculated. Figure 5.26 shows (b): word processing. Figure 5.27 (c): graphics. Figure 5.28 (d):

video or audio. Other Likert items included Figure 5.29 (e) spreadsheets:, and Figure 5.30 (k): creative work.

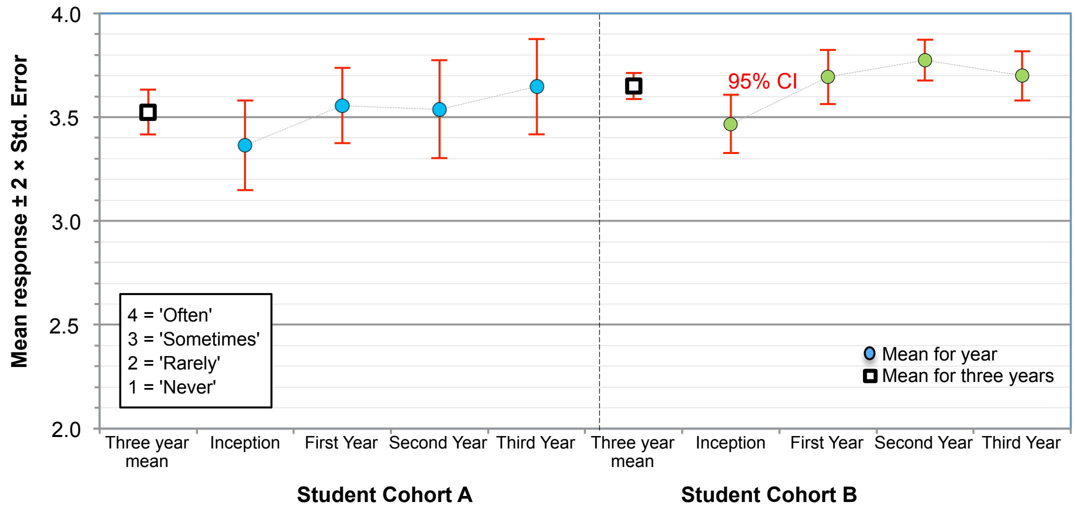


Figure 5.26. **Mean responses by students to Item two (b): I have used word processing to produce my work.**

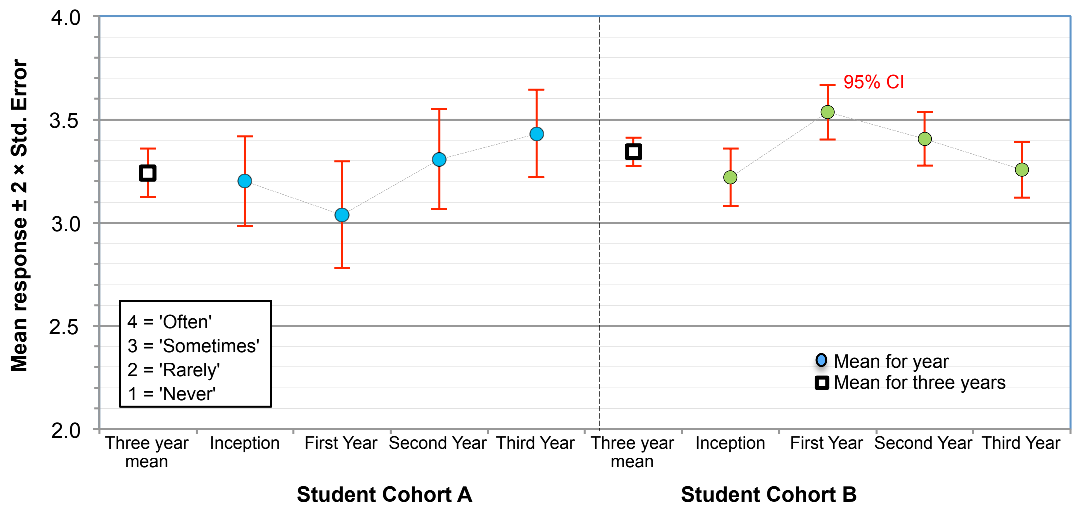


Figure 5.27. **Mean responses by students to Item two (c): I have used graphics to improve my work.**

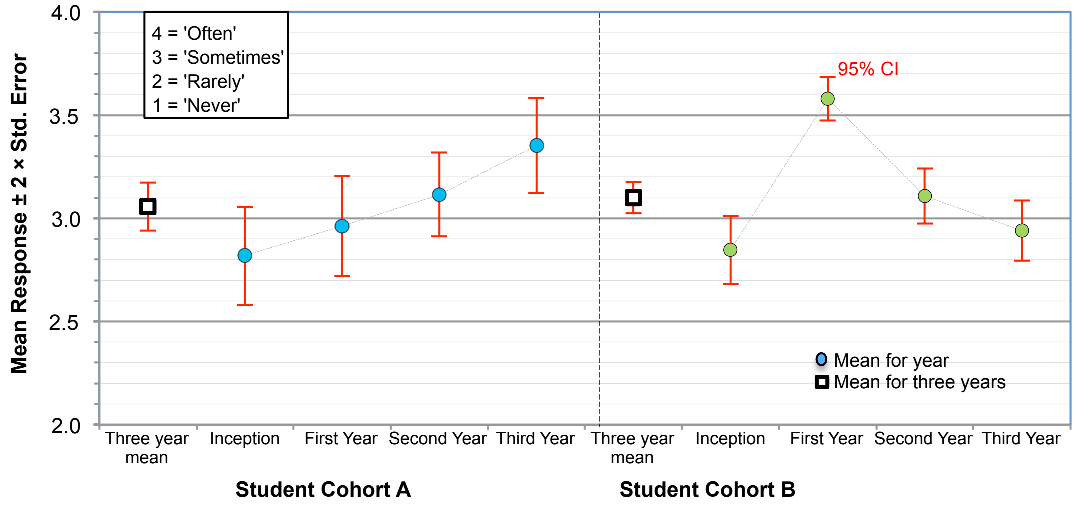


Figure 5.28. **Mean responses by students to Item two (d): I have used video or audio to improve my work.**

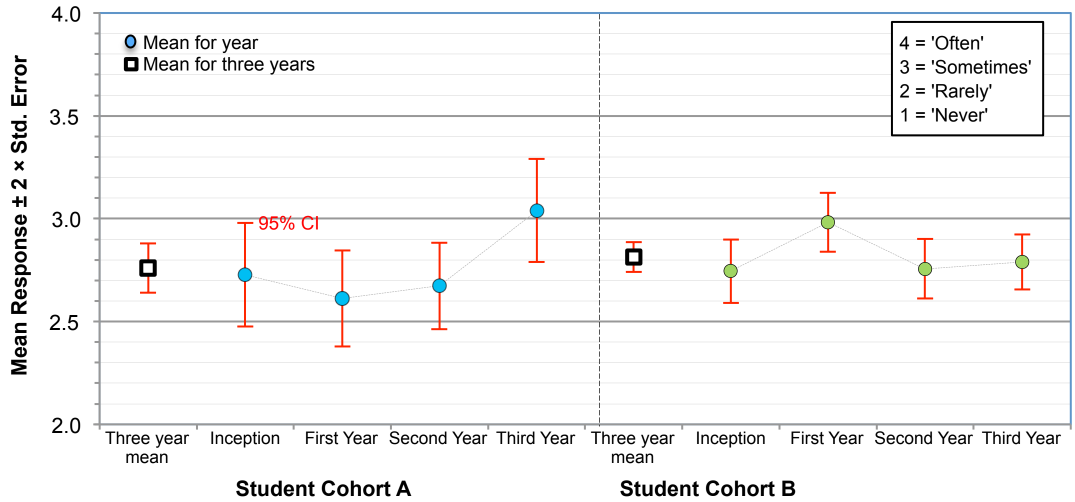


Figure 5.29. **Mean responses by students to Item two (e): I have used spreadsheets to organise and present information.**

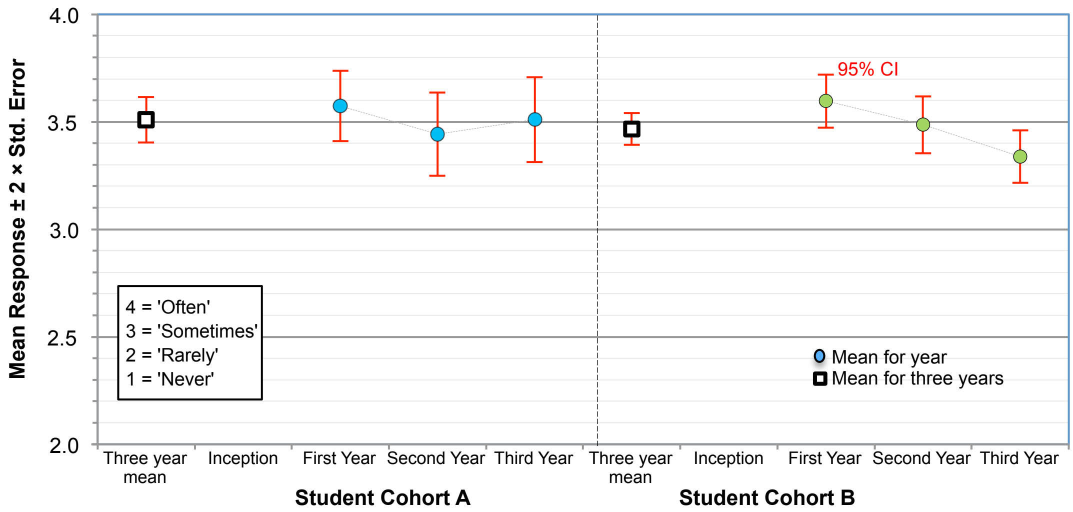


Figure 5.30. **Mean responses by students to Item two (k): I use my laptop for creative work.**

Responses to Item Two: b (word processing), c (graphics), d (video or audio) and k (creative work) indicate that students mainly answered in the *sometimes* to *often* options. Students from both Cohort A and Cohort B mainly responded that they used their laptops for creating documents. Both cohorts also considered their work on their laptop to be creative. Students used spreadsheets to organise and present information *rarely* and *sometimes*.

5.5.1 Types of creative uses

When posed with question one and question five of the annual interviews: "How have you used your laptop at school over the last 12 months? and "How do you use your laptop for creative work?" students reported 10 examples of creating with ICT throughout the study. The types of creative uses as shown in Figure 5.31 contribute to a broader understanding of how students perceive to be creating with ICT.

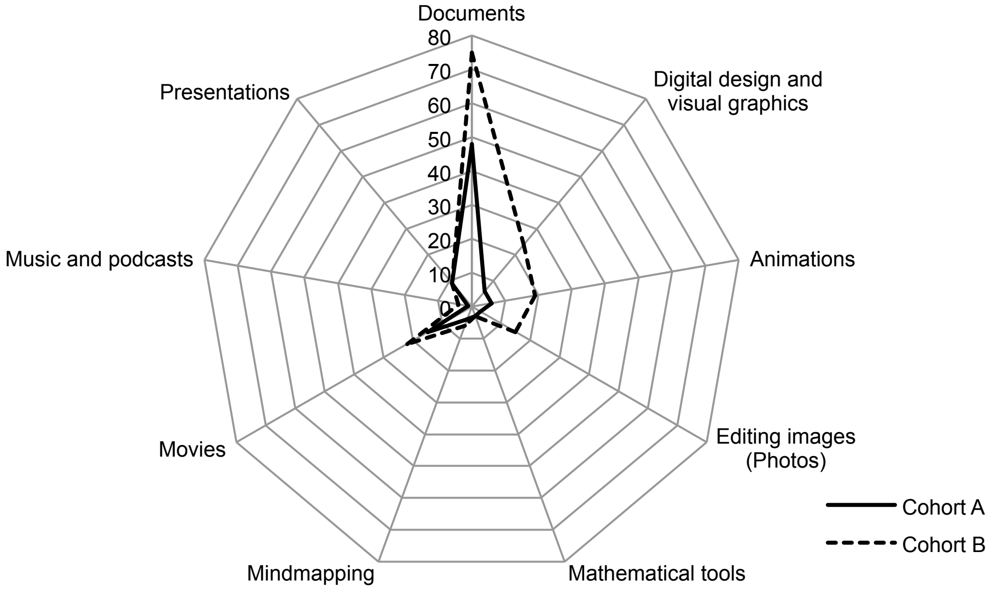


Figure 5.31. **Student participants from Cohort A and Cohort B qualitative responses on what they perceive to be creating with ICT.**

Creating documents with laptops recorded a high number of responses from both cohorts when asked: "How do you use your laptop for creative work?" All ten students from Cohort A and eleven from Cohort B reported using software packages such as Pages (word processing) and Comic Life (program for creating comics) for the creation of posters, brochures and word processed documents:

> Probably in English. We had to make a picture book, using Comic Life, a program on the computer. And you had to ... it has to be about a social like problem, so I did one on the environment. We had to sort of research a bit, have a look about, like, what's happening in the environment and then you had to make a picture book about it and draw, you drew, I drew the pictures on the paint and yeah, paste. (B162010)

> We use Pages to create posters, brochures and write up information. We also use Comic Life where we create a series of events with pictures. We created a story book which was fun. (A082012)

Five students from Cohort A and eleven from Cohort B reported creating animations with their laptops using Adobe Flash or After Effects, I Can Animate or Stykz. Students enjoyed using their laptops to create animations:

> We use it in ICT for making programs and making animations. When it comes to making these animations, we use Flash and Stykz. I have used another program called I Can Animate as well. This type of learning is so much fun. (B242011)

> We made animations using I Can Animate. Yeah, that was pretty fun. (A062012)

> Sometimes we use it for, like, in AIT [Applied Information Technology], computing, we use it to make animations with After Effects, and we then use Dreamweaver to make webpages to include them. (B142012)

Sixteen students from Cohort B stated using laptops for digital design and visual graphics, compared to four students from Cohort A. Cohort B seemed to have a greater exposure to software such as the Adobe Creative Suite (Photoshop, Illustrator, InDesign, After Effects, Flash). Editing images also interested Cohort B, with 14 students stating they used laptops to edit images using programs such as Gimp, Adobe Photoshop and iPhoto:

> Well, for IT we've been doing Stykz and that kind of thing but we also use it for, like, Instant Alpha out photos and Photoshop and that kind of thing so they're the main creative things. (B212011)

> Well for creative work I use a lot of photo image software. When I use some pictures off the Internet or other images I use a program like Gimp or Photoshop to improve the picture or image. Like using Instant Alpha or crop or adding parts to an image. (B202011)

Four students from Cohort A also stated that they used laptops for editing images. Students also reported making movies (Cohort A = 6 and Cohort B = 13) and presentations (Cohort A = 6 and Cohort B = 7) with their laptops. Students reported using software such as iMovie, Garageband, and Keynote to create subject related tasks:

> Well, we've got the opportunity to make posters which has been fairly creative because we've been able to add effects and get pictures and stuff and I suppose iMovie and Keynotes because you can always put in transitions and sound effects, things like that, and a few Garage Band podcasts. (A012011)

> Well, at the start of the year we had to make a video using iMovie and Garageband for SOSE [Studies of Society and Environment] which I thought was good to learn about how to edit videos and things like that. (B162012)

Students from Cohort B in the third year [Gaming Forum] of the study suggested that creative uses of ICT were taking precedence over distractive elements:

> Another point is that people are getting more creative and instead of gaming as such, people are focussing on things they want to do. Some people are on Photoshop making things or web designing and, like, not gaming but not exactly on task but doing something, like, more creative towards their future or something. (Gaming Forum 4 Cohort B 2012)

Student capacity to create using laptops developed across both cohorts over time. Laptops had enabled students from both cohorts to access a new level of digital creation tools, beyond the previous typical pen and paper approach. The implementation of the 1:1 laptop program had demonstrated the ability by students to create movies, animations, presentations and digital documents.

5.5.2 Organisation of thoughts and management of work

Question 11 of the annual interviews was used to elicit an understanding of students' organisation of thoughts: "To what extent has the use of a laptop helped you organise your thoughts?" Students reported five types of responses: brainstorm, electronic calendar, notes and reminders, shift from paper and use of laptop, and a tool to manage their thoughts. Three students from Cohort A and four from Cohort B stated they would brainstorm and create a mindmap to help them organise their thoughts. They believed this was an effective way to use the laptop with the help of the applications: MindNode or Inspiration (mind mapping applications):

> A lot better because sometimes when you do not have a piece of paper on you, you can just go onto Inspiration or MindNode and just brainstorm all your ideas on the paper. You can delete them later on and you can even put them down and it will make a chart for you. (A052011)

> Well, with applications like MindNode and Stickies, it just helps you out, you know, it's got them all laid out ready, and you can always just tick things off much easier, and it's easy just to get back to your notes and stuff. (B262012)

Fourteen students who were all from Cohort B indicated using the laptop as a tool to manage themselves. Interestingly there were no coded responses from Cohort A when referring to the laptop as a management tool. The following excerpt provides an example of how a Cohort B student used his laptop for the organisation of his thoughts:

> Before the laptops really came along, I had a bit of trouble using the diary. I tended to try and remember everything. With the laptops, they're a much more efficient and effective way of doing it because if you can't remember everything you just go to your documents and scroll through the subjects and then if you see a document you were working on in class. For example, 'Oh, I didn't finish this piece of work, go on.' (B112012)

Eight students, two from Cohort A and six from Cohort B, believed that with the shift from paper based activities for learning there was an overall improvement in file management skills when using the laptop. These students reported having a file structure in place to save and retrieve documents on demand and no longer relied on a paper diary:

> Definitely just being able to, like, arrange folders, have some files in here, some files in there and just being able to have everything on one machine and able to access everything with a few clicks of a button. It's really good. (B192011)
>
> The school diary system was a start, definitely, on the organising the thoughts program, but the fact that it was so small meant that I could lose it quite easily and forget to bring it home or something. But, I always bring my laptop home so I have taken to using the Stickies application which you can essentially put a post-it-note on your desktop and then write down your diary stuff. (B112011)
>
> I think the laptop's really helped me actually because, especially in the last year I have been trying to really pick up my school work and the best way to do that is to get organised and I think by creating, like, a filing system that works for me. It's really helped me to, like, put everything in place and understand what I've got to do and when I've got to do it because all my work's just there and I can get at it easily. (B162012)

Implementing a 1:1 laptop program had provided students with an alternative digital approach for keeping themselves organised for the following: making notes and reminders, brainstorm, and use of an electronic calendar. The types of applications stated by students to organise their thoughts were: iCalendar, Inspiration, MindNode, Pages, Keynote, and Stickies. Organisation of their thoughts appeared to relate to school tasks concerning organisation (e.g., remembering dates for assignments and assessments). Brainstorming and the use of mind mapping applications were used but perhaps under-utilised by both cohorts for organising their thoughts.

5.6 Communicating with ICT

Both Cohort A and Cohort B reported using their laptops for communication when responding to Item Two of the questionnaire. Cohort A laptop use, for Item Two: (l): "I use my laptop for communication" mean score increased significantly (One-Way ANOVA, $p < 0.05$) between the first year (2.8 ± 0.3) and the third year (3.3 ± 0.3). The corresponding Cohort B mean score did not change significantly as seen in Figure 5.32. Students responses from Cohort A were mainly concentrated in the *rarely* to *sometimes* options compared to students from Cohort B who were concentrated in *sometimes* to *often* options.

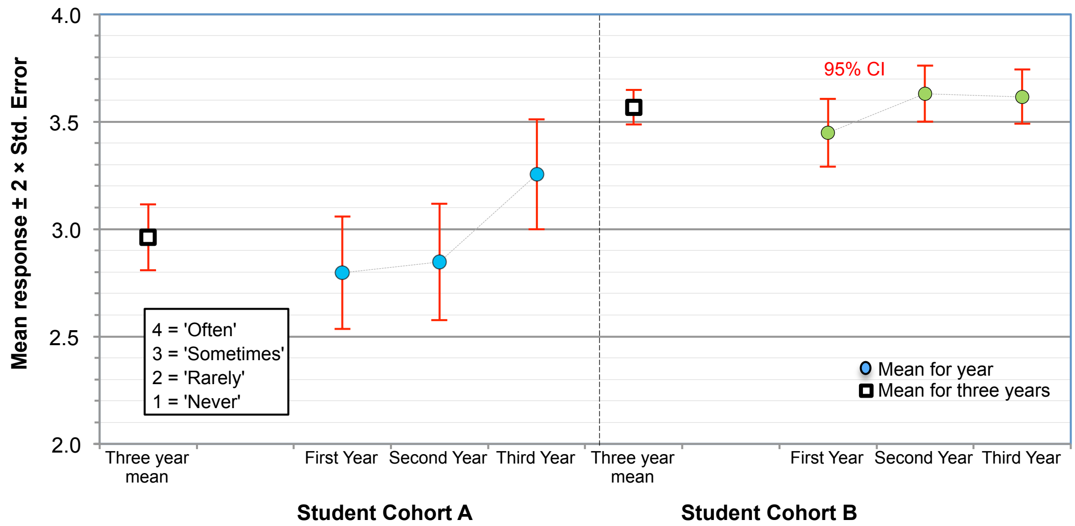


Figure 5.32. **Mean responses by students to Item two (l): I use my laptop for communication.**

Cohort B recorded a significant decline (One-Way ANOVA, $p < 0.05$) in the mean score (-0.2) between the first year (2.5 ± 0.2) and the third year (2.3 ± 0.2). Subsequently, student participants from Cohort B were mainly concentrated in the option *rarely* as seen in Figure 5.33.

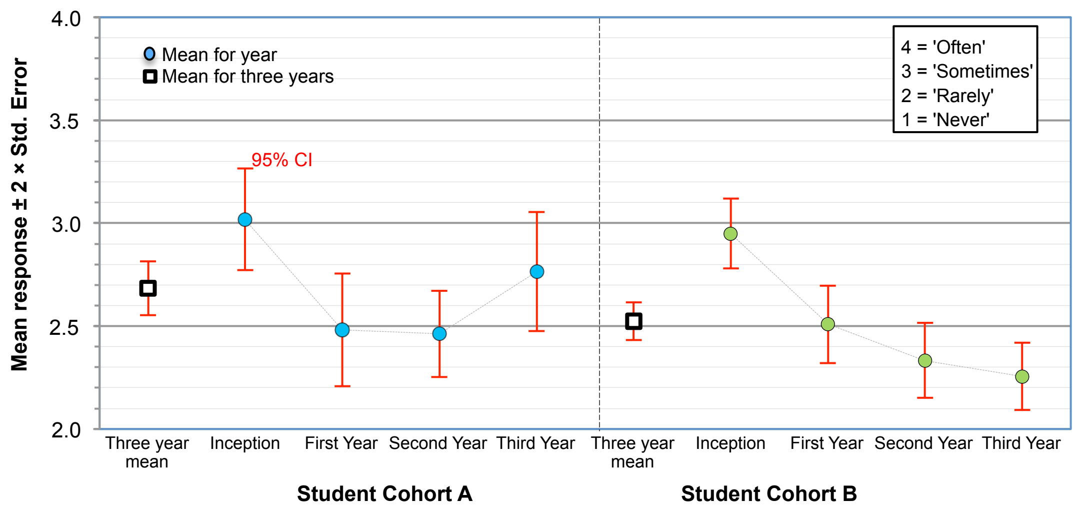


Figure 5.33. **Mean responses by students to Item two (f): I have used email to communicate with other students.**

Similarly with Item Two: (g) “I have used email to communicate with my teacher” the mean score for Cohort A increased significantly (One-Way ANOVA, p < 0.01) from the first year (2.9 ± 0.3) to the third year (3.4 ± 0.2). The mean score of Cohort B's email communication with their teachers increased significantly (One-Way ANOVA, p < 0.01) between the first year (2.8 ± 0.2) and the third year (3.1 ± 0.2) as shown in Figure 5.34.

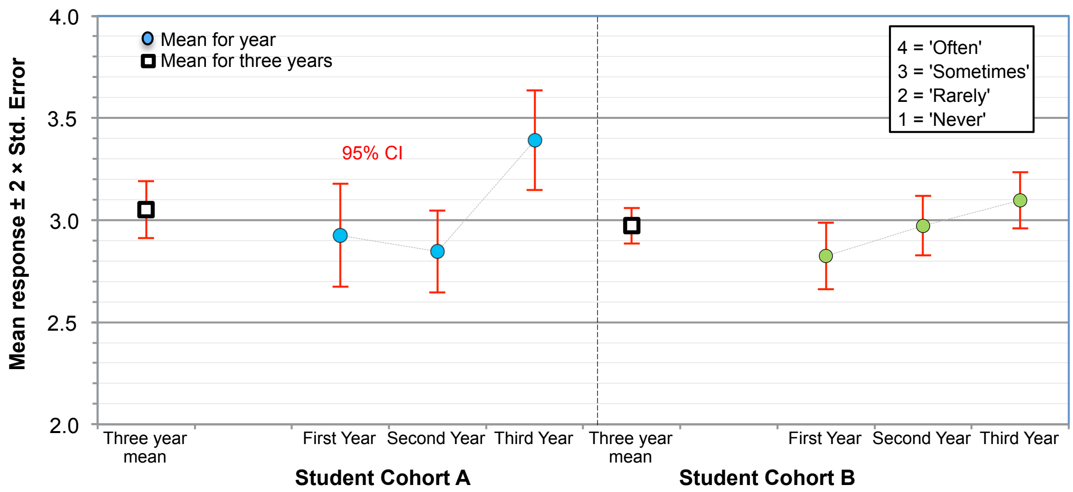


Figure 5.34. **Mean responses by students to Item two (g): I have used email to communicate with my teacher(s).**

The following examples are drawn from the first year and the third year of the study from Cohort A student responses to Question Eight of the annual interview: "How do you use your laptop for communication?":

> I don't usually communicate with my laptop. Usually I just talk to people over the phone. I sometimes use email, but not very often. (A032010)
>
> Communication would be more on email if I've got a task in, and I'm handing it in a little bit earlier, usually email whatever teacher I've got for that task by emailing it to them and to see what they think of it so I can do better. (A092011)
>
> I would use e-mail more than I would do in Year Five because we've got more homework to complete, like, the teacher would say e-mail it to you, so we would have to check what they send us and then e-mail it back. (A082012)

Students from Cohort A in the first year had a limited understanding of the term electronic communication. Of the 10 students interviewed from Cohort A, seven said they either did not use email or had not used a form of electronic communication. Of the three students who indicated they used electronic communication, their level of competency was basic. For example:

Q: Can you give me an example of an activity in which electronic communication was really helpful, and tell me how it worked?

A: I really enjoyed learning how to use email and everything. I used to not know how to send emails, or do anything like that. It's actually very useful, because you don't have to dial in the numbers on the phone, you don't have to go around and chat to them, you don't have to write a letter, you can just do something that is ten times faster. (A062010)

By the second year, students in Cohort A had become more accustomed to electronic communication. This was highlighted when all 10 of the interviewed students mentioned using email, and applications such as Skype and social media (e.g., Facebook). By the third year of the study, four students from Cohort A reported using Facebook to communicate on their laptops:

> I usually go on Facebook to chat with my friends. (A072012)

Thirteen students from Cohort B conveyed their preference to communicate with students via Skype rather than email:

> I was doing an assignment with my friend and he was sick on the certain day that we had the subject so I was able to actually, when I went home I was actually able to get on Skype and talk to him about the project so I could tell him if you want to do this and I'll do this. We were able to get together later on and finish the project, so that helped out. (B162010)
>
> Skype mainly. I generally just have that open just in the background and if I'm doing something, someone, like, messages me, and generally I would tell them, like, 'Sorry, I'm working,' but I always keep it open because I have like a superstition that someone's going to say something important, and I don't want to miss it. (B192012)

Facebook was another mode of communicating with laptops for Cohort B. Seventeen students indicated using Facebook by the third year of the research. As popular as Facebook seemed, using Skype was seen as the alternative method of online communication by Cohort B. Students reported enjoying using Skype through conversation, instant messaging or video. The second part of Question Eight of the annual interview was "Can you give me an example of an activity in which electronic communication was really helpful and how it worked?" Twenty-four of the 30 students involved in the annual interviews from both cohorts (Cohort A = 7 and Cohort B = 17) reported using Skype to communicate for personal and school related purposes. According to both cohorts, the use of Skype was a well-liked method of electronic communication compared to that of email:

> Well, last week we had an assignment, group assignment, and we were using Skype to see what we could do, like, sharing each other's information. (B242011)

> Often if my friend and I are working on a project together we'll go on a Skype call, a video call, and we'll just discuss and figure out what we need to do and how we need to tackle the project, and we can work through it, like, ask each other questions, that kind of thing. (B162012)

Fourteen students from Cohort B were beginning to increase their use of email with teachers. Twelve students, all from Cohort B, had recognised that email was the preferred and primary mode of electronic communication used by teachers at the School:

> I mostly use my laptop to communicate by using e-mail quite a bit. I do not use many of those social networking sites on my laptop, so it is most of the time by phone. Yeah, I would mainly say email with the teacher as this is the only way I have used my laptop to communicate with them. It is really the only thing they use when it comes to communicating with our laptops. (B182012)

> Because now it's becoming, like, more of a need with the teachers contacting you through it. We need to check it regularly to keep up with, like, exams and work being sent out. (B172012)

Both cohorts of students had increased their use of email between the first year and the third year of the study. However, students preferred using Skype and Facebook amongst each other for electronic communication.

5.6.1 Social media: Facebook

Item 17 of the annual questionnaire was concerned with students' use of social media. *Myspace*, *Facebook*, *Club Penguin*, *Twitter* and *Bebo* social media sites were relevant for the age groups involved at the case study school (ACMA, 2013). Students could select any of these sites or *I don't use any*. In the first year, 31.5% of Cohort A used social media; by the third year, this had increased to 39.2%. Similarly, for Cohort B, in the first year 70.2% used social media and by the third year, this had increased to 91.0% (see Figure 5.35). The rate of use of social media in Cohort B is consistent with research from Europe where 82% of 15-16 year olds use social media (Livingstone et al., 2012).

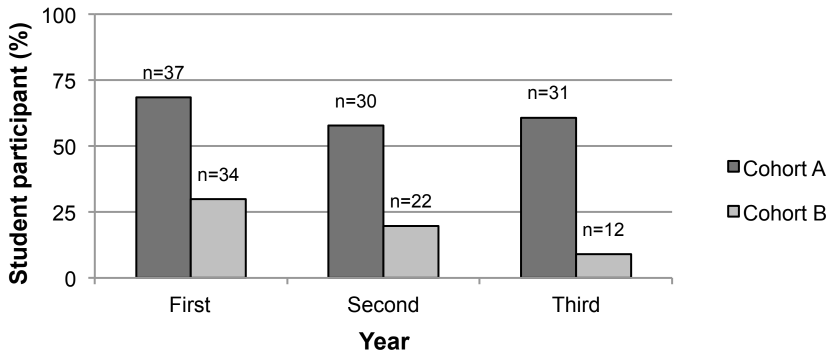


Figure 5.35. **Student participants who did not use any form of social media.**

Facebook, over the duration of the study, recorded a rise for both Cohort A and Cohort B. In the first year, 18.5% of Cohort A used Facebook; by the third year, this had increased by 20.7 percentage points to 39.2%. Whereas for Cohort B, in the first year, 70.2% used Facebook and by the third year, this had increased by 19.3 percentage points to 89.5% (see Figure 5.36).

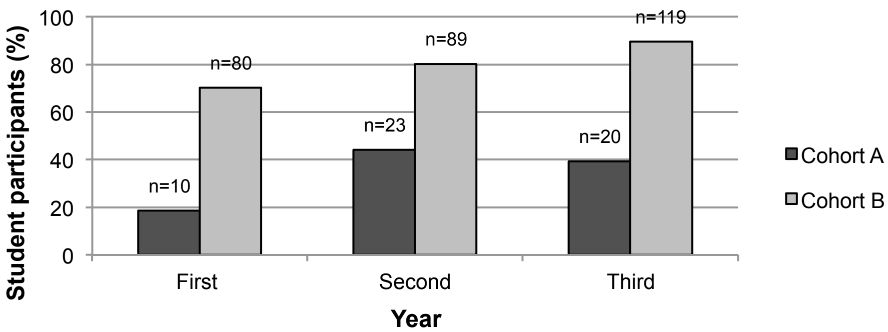


Figure 5.36. **Student participants' reported use of Facebook between the first year and third year of the study.**

With this difference between the cohorts now apparent, a theme emerged through the annual interviews about the changing interests between the two cohorts. Four students from Cohort B indicated that over time, their interest shifted from gaming to the use of social media:

> In Year Seven I would play games a bit during some lessons and now not at all. I have kind of moved away from games. I spend more time using Facebook. (B172012)

The following excerpt is taken from a Gaming Forum held in the third year of the study with Cohort B participants (GF42012) demonstrating this shift:

> **Q. Have you moved away from games, like, in Year 7 through to Year 9?**
>
> A. I don't play games.
>
> **Q. What about social media?**
>
> A. I think it's more Facebook.
>
> A. More Facebook.
>
> A. I think, like, the one time I play games is when I'm, like, no access to the Internet, and then the only thing to kill time is play games, but when I'm at home, and I have access to the Internet, I will go to Facebook instead of playing games.

Facebook was an activity students took part in off the School site. There were limited references to Facebook being used during class, as it was a blocked site on the School network. The next section discusses the reported use of Facebook on the School site through mobile phones.

5.6.2 Mobile phones, hots spots and tethering

Student ownership of mobile phones increased during the study. Students had a greater capacity to use their mobile phones to circumvent the network and enter blocked sites such as Facebook by using their mobile phones as a 'hotspot' - a wireless access point. Mobile phones, prohibited during class time, tended to be out of sight during lessons. However, there were reports of students using their mobile phones to access the Internet and Facebook:

> They just go on their phone. Because it doesn't get monitored and the app on your phone, for your iPhone, you click on it and it takes you straight there and you could just flick through, check stuff. I've sat next to people who are on Facebook. There's only, like, one or two people in our class that do it. (GF21012)

In response to Item 15: "Do you own a mobile phone?" 82.3% of students in Cohort A and 95.5% of students in Cohort B said they owned a mobile phone in the third year of the study. Mobile phones could be problematic for schools that attempt to monitor their students' online usage as students have the ability to bypass networks with their own hotspots or personal networks.

5.7 Applying Social and Ethical Protocols and Practices when Using ICT

5.7.1 Acceptable use of ICT

To ascertain some of the social and ethical issues experienced during the implementation of the laptop program interview, Question 12 asked students “What is it like having a classroom with each student having their own laptop, and explain student behaviour?” Initially in the first year, 11 students, who were all from Cohort B, reported a mix of behavioural and operational issues when using laptops in classrooms. Eleven students from Cohort B also commented on being attracted by the laptop, which increased the potential for off task behaviour:

> Sometimes it’s good, sometimes it’s not because you could be working in a group, and one person could be on the computer finding out some info while you could just be typing and they could just be reading it aloud and you could just change the words around and it’s a lot quicker. But, there are also disadvantages if the person next to you decides not to cooperate and plays games and you’re trying to do the work, which annoys people. (B252010)
>
> Well, it’s just sort of like tempting because, you know, you’ve got your dashboard on the computer and you can just sort of click in and click out really quickly, and there is like lots of little gadgets almost sort of things, like, just little things that you can, you know, play with. (B162010)

Six students from Cohort B and one from Cohort A reported that by the third year of the study, the device had lost its initial appeal. It appeared the novelty factor was no longer as strongly connected with the 1:1 laptop program:

> I guess Year Seven it was a lot different, they were a new toy, it was great fun. Now everybody, I guess, the novelty’s worn off, so it’s a lot better, everybody’s using it more effectively. (B282012)
>
> It’s normal now. Before everyone used to be shocked and, you know, like, amazed that they got a laptop, but they used to, like, be so excited they used to use it all the time but now it’s considered as normal. You know, no one really cares much, they just use it normally, like, how you guys expect us to. (B262012)

Twenty students (Cohort A = 5 and Cohort B = 15) reported increased chances of off task behaviour occurring and causing disruption to learning at the start of the 1:1 laptop implementation. These 20 students identified the lure of a new laptop heightened the potential to lose focus and impact on classroom behaviour and learning. However, as the students progressed through the subsequent year levels of schooling, examples of how they had improved and developed as responsible and ethical users of their laptops became apparent:

> It's gone from projects to class homework and projects, so yeah, it's been a different change, but yeah. I think I am more responsible in how I use the laptop. I'm better at web searches and how I use this information. (A012012)
>
> Now it's just a normal piece of equipment. People, like, got their heads around saying, 'Alright, I've actually got to really focus now and work. I can do this whenever I want, really.' (B262012)

Twelve students from Cohort B and one from Cohort A confirmed their shift from the device being a source of distraction to better focusing on learning. With the lure of distractions or the temptation with the laptop reduced, there appeared to be a more sophisticated attitude towards the use of the device as a learning tool, also noted by Won Hur and Oh (2012).

5.7.1.1 Searching for information

Question four of the annual interviews was: "When you used a web search for information, how did you decide which was the most important information?" Students from both cohorts reported six methods of deciding if the information was important. Responses included the credibility of the website (e.g., the URL's domain included .edu or .gov), guidance from teachers, and reading and comparing information between websites. Responses also included the topic relevance, website statistics (how many times had the website been accessed or used by other users) and interestingly Wikipedia (see Figure 5.37).

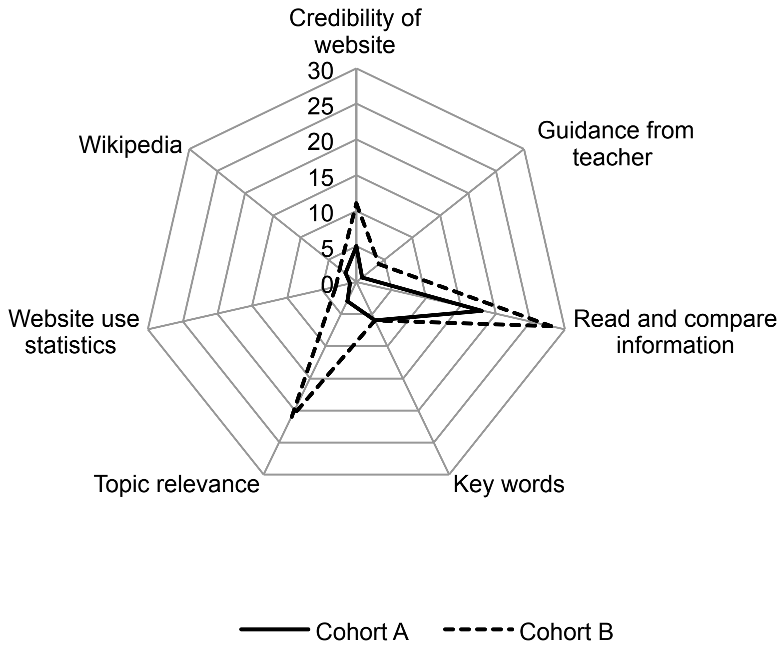


Figure 5.37. **Student participants' coded responses on deciding on important information from websites.**

Both cohorts reported that the preferred method of deciding on appropriate information from websites was to read and compare information between websites. All 10 participants' information from Cohort A and 12 from Cohort B reported reading many websites and comparing to see what was most important:

> I normally go on various websites to, like, see if they're accurate and see if they come up with the same answers. (A072012)

> I just read through them and see which one's more detailed. Maybe go to, like, three different sites, and if they all have different information then I know that they're not right until I find three sites that have the right information. (B172012)

Credibility of the website was the second highest reported criteria of deciding on the most important information. Four Cohort A students and nine students from Cohort B believed the credibility of the selected website was important:

> I always look at more than one source and if the same things keep popping up on different sources then you get the idea that it should be correct and so if it's just ... like, everyone says don't trust Wikipedia and so you look at other sites and if everything seems to, like, mesh together and be the same sort of stuff then you know it should generally be the accepted point of view. (B192012)

> I usually just skipped Wikipedia and went to the government websites, so I knew they were reliable. (B142012)

> First of all I look at the names of the links, and I click on them and see if ... see what kind of website it is like .com and .uk and stuff, and I read through it quickly to see if it's the website I want and then I read through it properly if it is. (A032012)

According to the responses, students from both cohorts rarely checked if information was authentic with either their parents or teachers. Four students from Cohort B and one student from Cohort A reported checking with teachers. One student from Cohort A mentioned checking information with his parents. Cohort B did not report using their parents as a method of checking their information. Students from both cohorts had demonstrated attempts to validate the information. The approaches used showed a reliance of self checking websites and reading information.

5.7.1.2 Educational games

Boys' perceptions of educational games largely equated to Mathletics, possibly because of the inbuilt competitive nature of this tool. Mathletics was commented on by both cohorts and 25 students (Cohort A = 9 and Cohort B = 16) indicated there was a place for games in education if they served a purpose:

> The first thing that comes to mind would be Mathletics, and I think that really helped me with my maths, like, my speed and just basic arithmetic. Yeah, that really did actually help me, so yeah, I think that games help. (B162012)

> Well, I guess it kind of depends on the game. If you do one of those shooting games where you just shoot people it's obviously not helping you to learn but if it's a game where you're versing your friends and trying to do mathematics on it – a game like Mathletics. (B252012)

Mathletics was the most frequently mentioned educational game used at the School. With a range of literature available about the opportunities of games and learning (Gee, 2011; Gresalfi & Barab, 2011; Steinkuehler, Squire, & Barab, 2012), Chapter Eight will discuss the potential of gaming as innovative practice.

5.7.2 Unacceptable use of ICT

A theme, which emerged throughout the study, was the changing nature of the classroom with a variety of differences between a classroom in the first year compared to the third year. At the implementation, five students from Cohort B mentioned a surge in playing leisure-orientated games and utilising the applications and widgets located on their laptops during class time:

> I do have a small comment. It's the fact that the spread of games. When a person, one person buys a game off the net or something everyone sees him playing it, and it's like that's new, that's good, let's copy him. And then they see it, and he gives it to his friend, he gives it to his friends and then it's just a wild fire, and it spreads through the entire school and nothing can stop it. And then the teacher's blinked, turned around to scratch something on the whiteboard and next thing they know the entire class has gotten a new game and is talking animatedly about it. (B112010)

A typical junior (primary) school is different to a middle school (secondary) setting. A junior school predominately has one teacher in one classroom for the duration of the day. Whereas, in a middle school, students move from class to class for each period. Participant 01 of Cohort A describes the classroom dynamics in a junior classroom when asked Question Twelve of the first year interview: "What is it like having a classroom with each student having their own laptop?":

> It can get a bit noisy sometimes because a lot of us are just really excited that we're using a laptop heaps. I know, I'm feeling this but I'm not sure if a lot of people feel this way, it's better than just sitting under a whiteboard all day and getting the teacher to do all the things. With this, you get to actually interactively do the stuff. (A012010)

The following second year excerpt from participant 19 in Cohort B is an example of unethical use of ICT occurring in classrooms. The participant indicated that computer games and other 'stuff' distracted him from his learning.

Q: ***What is it like having a classroom with each student having their own laptop?***

A: It's really cool, except sometimes people aren't really doing their work. They're, like, sometimes on games and stuff, but still it's really cool.

Q: ***Do you think you are more focussed as a student with your own laptop, and explain?***

A: Most of the time, yes, but sometimes you can get distracted.

Q: ***So can you tell me about those distractions?***

A: A lot of people have been passing around dashboard games, and a lot of people can flick to their dashboard and then, like, as soon as the teacher comes round, they can just press a button and all the games, like, close instantly and go back to the normal.

Q: ***So how do they flick these dashboard games around?***

A: There's a button you click. There's, like, a dashboard and you can get all these widgets. You can get weather, time, and all this stuff and, like, games and everything. And you just open them, because when the dashboard opens, like, the screen goes all dull and then it opens up your dashboard and then you can just go to this site and download different widgets and everything and people tend to play games a lot. (B192011)

Four students from Cohort A and nine from Cohort B reported that this subversive behaviour made the role of the teachers increasingly demanding. Teachers faced an added burden of dealing with distraction on a scale not previously experienced at the School:

> I think definitely because knowing that when laptops came in, knowing that kids could play games and do all different things on their laptops, not doing their work, teachers will have to be more observant of the class to see what it looks like when kids are not doing work, and what it looks like when kids are doing work. (B182011)

> Well, for the teachers it is probably a little bit harder because you do not always know if a student's doing the right thing or the wrong thing. (A062012)

Two students from Cohort A and six from Cohort B suggested practical solutions to minimise these behaviours. These eight students believed it was necessary for the teachers to be active and engage students in learning when using laptops. An example of this was:

> More interactive teachers that really engage in the conversation and try to teach you something instead of just giving you work and then sitting back down at their desk. (GF42012)

> I think the teachers need to, yeah, walk around the class more because they're just leaving them to their own devices. (B232012)

Six students from Cohort B reported being confused about why some teachers did and did not use laptops for learning. These six students shared a view that teachers were cautious and on guard when using laptops in their classes. Some teachers went as far as repositioning the desks in their classrooms to have a better view of the laptops:

> Well, it depends on the teacher a lot of the time and what students in the class are like. Some teachers almost make it slightly uncomfortable because, like, they make you turn the desks around, and then they act like everyone is some sort of criminal, that they're just waiting to do something wrong on the laptop. Then there's some people who do something wrong on the laptop, and then if they get caught then the teacher gets even more superstitious and then everything just snowballs up to, like, ... yeah. Teachers just don't trust us. I think that's an aftermath of what we did in Year Seven [First Year]. (B192012)

The introduction of the 1:1 laptop program had altered a range of aspects in the classroom as indicated by the feedback from the students. Students presented a range of suggestions for consideration when teaching in a 1:1 laptop or mobile device class. Section 5.8.1 discusses these student perceptions about teachers.

This section defines gaming as computer based games found on laptops and played during class without the permission of the teacher. Approximately half the students from both cohorts (Cohort A = 4 and Cohort B = 10) believed gaming in the classroom was a distraction:

> A lot of people have been passing around dashboard games, and a lot of people can flick to their dashboard and then, like, as soon as the teacher comes round, they can just press a button and all the games, like, close instantly and go back to the normal. (B192010I)

Gaming decreased during the first year and continued to fluctuate throughout classes over the course of the three year study. Nine students (Cohort A = 4, third year and Cohort B = 5) reported the use of games such as Minecraft. The following excerpt from an interview in the third year of the study is of Participant 02 from Cohort A discussing the topic of gaming:

A: It’s a fair bit quieter because I think everyone’s a bit more engaged now that we have laptops. But a lot of people in my class are getting distracted on the laptop, like, through offline games.

Q: What type of stuff are they doing?

A: The big popular one is Minecraft, and before in this year there was Motorbike.

Q: So how are they playing Minecraft now, is it just off the network?

A: Off server so no one can track it.

Q: But how are they doing it in class if a teacher’s teaching?

A: It’s often when we’ve started work, and because the desks are facing away from the teacher they can’t see what’s happening on the laptop. A022012

During interviews, 13 students (Cohort A = 3 and Cohort B = 10) mentioned Call of Duty (COD). These 13 students said that they had either played it or seen it being played during a lesson in the first year. However, post the first year of the study it emerged that the use of this particular game by the students had ceased.

Q: Has the tendency to be on-task improved from last year to this year?

A: Yes, it has. Last year kids played COD, and this year no-one plays Call of Duty because of the monitoring of the system, and kids will get in trouble. (B142011)

Other games that seemed to have resonance with the students (Cohort A = 5 and Cohort B = 7) were the Visual Boy Advance (VBA) and Flash designed lightweight style games. These games were offline games that were similar in design to that of Game Boy (Nintendo – hand held gaming device); relatively low in file size and designed for playing on computers. Students indicated that VBA and flash games such as Pokémon and Motorbike were quite novel in appearance and game complexity, and classified as a 'surge' style of game. Both cohorts believed that VBA games did not last for a long time, and were more of a short-term fad or trend:

It goes in surges, you've got a surge of recent games and then it drops off and another one takes its place but they kind of stick around. You've got Minecraft, the Flash games, the VBA that just came around recently ... (GF42012)

Item 20 of the annual questionnaire required students to respond to the Likert item: "I play online games" part of a Likert-type scale: 1 *(never)*, 2 *(once a month)*, 3 *(every two weeks)*, 4 (*two to three times a week) and 5 (everyday)*. Figure 5.38 shows the mean scores over the three years of the study for Cohort A and Cohort B.

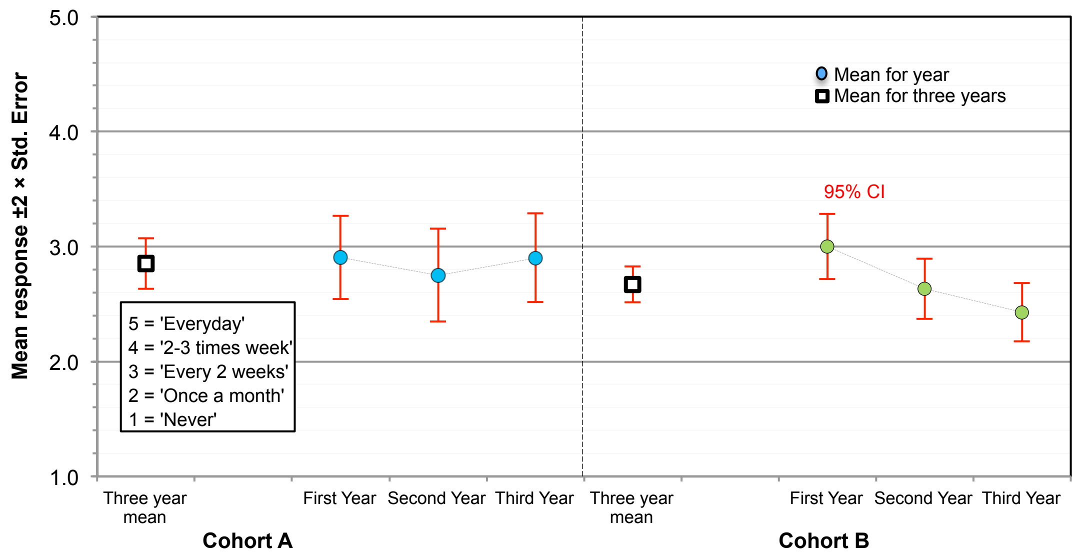


***Figure 5.38.* Three year mean scores for student participants' frequency of playing online games.**

Students from Cohort A recorded a stable mean score of about 2.9, situating student Cohort A in the '*Once a month and every two weeks*' options. Student participants from Cohort B recorded a mean of 3.0 ± 0.3 in the first year, and falling significantly (One-Way ANOVA, $p < 0.01$) by the third year to record a mean score of 2.4 ± 0.3. This decrease indicates students from Cohort B had significantly reduced their frequency of playing online games. However, with students from both cohorts indicating spending a proportion of time playing online games it gave an insight into the possible effect gaming could have on learning. How students managed themselves away from school with the distractions of playing games could impact on learning. Without a teacher to supervise or direct students to stop playing games and complete work, students were required to self regulate their use of the laptop. Chapter Eight will discuss the impacts of gaming and the associated issues that arose over the three years of the study.

5.8 Overall Student Satisfaction of Laptop Program

Question 30 of the third year interview asked students: "If you were in a position of power would you keep the 1:1 laptop program or remove it?" All 30 student participants from both cohorts indicated keeping the 1:1 laptop program. Using laptops for learning was enjoyable according to the 30 students. Both cohorts believed that the laptops were an efficient way to learn and were important for their development:

> Because a lot of people are more interested. They are more intrigued in learning now. (A042012)
>
> I think it's really important to keep with the times, kind of thing, and when we do go out into the workplace a lot of it's going to be computer based and a lot of the work we do will be computer based, so I think it's important to have the skills that we need when we go out into the workplace. (B162012)

With recognition of the related distractions since the introduction of the 1:1 laptop program, students believed the laptop program should remain. Regardless of the issues encountered, students remained positive about the 1:1 laptop program.

5.8.1 Students' perceptions about teaching and laptops

In a generation where technology is no longer optional (Murphy, King, & Brown, 2007), students' perceptions about the types of teachers who are effective and how they could engage a class or even control a class with laptops was another theme to emerge. Students from both cohorts were able to describe, in their view, effective teaching styles and teacher traits reducing off task behaviour. Four students from Cohort A and seven from Cohort B held the view that teachers who were able to deliver a style of education tailored to their needs was necessary in increasing their chances of learning. Rayment (2010) shares a similar view about how differentiation allows students to work towards one aim in many different ways. These 11 students were articulate in defining the attributes of an effective classroom teacher in a 1:1 laptop environment. Teachers who were mobile and active were far more popular and well respected than those who set work, then sat at a desk behind their own laptops. This mode of teaching and learning appeared to disengage the students and also increased the chance of off task behaviour. The following reflects what the 11 students classified as a highly effective teacher:

- Mobile teacher (meaning that the teacher is constantly moving);

  > Some teachers go and sit down at their desk; it depends which teacher you have, I guess, like, Mr Jordan [Pseudonym] probably the best maths teacher I have had in the whole of my time at this school because he is always moving around, you can not get off task. (B252012)

- Engagement (a teacher who provides stimulating tasks and conversations involving the class members); and

  > More interactive teachers that really engage in the conversation and try to teach you something, instead of just giving you work and then sitting back down at the desk. (GF32012)

- Discipline (a teacher who sets boundaries and followed through with warnings was deemed to be a teacher where the incidence of off task behaviour decreased).

  > If the teacher isn't as strict as some of the other teachers then boys would tend to kind of push the boundaries about, but obviously if the teacher's stricter and more consequences for acting out then they're not going to push the boundaries and talk and disrupt the class. (B162012)

The 11 students shared a common view about these three components of an effective teacher within a 1:1 laptop program. Students believed teachers who moved around regularly made it extremely difficult for students to partake in frivolous patterns of behaviour that would affect their learning. Student engagement was also important as it increased the potential to stay on task and ensure a deeper understanding of the teaching content. Teachers who sat at their desks for long periods of time reduced the potential for engaging learners and increased the chances for off task behaviours. The 11 student participants reiterated teachers in 1:1 environments can ill afford to sit at their desks for extended periods of time. These views are aligned with the study conducted by the Australian Council for Educational Research (ACER), 'Boys in School and Society' (Cresswell et al., 2002) and a range of specific strategies listed by MacDonald et al. (1999, pp. 18-19) to support learning for boys:

- highly structured instructions and lessons;
- greater emphasis on teacher directed work in the classroom in preference to group work;
- clear objectives and detailed instructions; explicit criteria for presentation of work;
- short-term, challenging tasks and targets with frequent changes of activities; and,
- planned program of differentiated personal and social development.

Another view conveyed by students at the third year interview, was the need for clear and defined boundaries within a learning environment. According to these students, teachers who set clear boundaries about expectations and requirements, and at the same time who are decisive in their behaviour management had a greater inclination to gain the respect and control of their students, and keep them on task:

> I think the problem at the moment is kids have done it once and then there's been no punishment or no follow through, they haven't been found out so they just keep on doing it. So maybe if they had harsher penalties and, like, more following through. (GF12012)

This study does not proclaim an authoritative regime with draconian behaviour management consequences, but more an agenda promoting students to take responsibility for their actions with clearly defined consequences. This approach put into action when required, could increase the teachers' ability to gain the position of authority in a 1:1 mobile device environment.

The following excerpt in Table 5.10 provides dialogue with Student Participant 11 from Cohort B in response to questions about how laptops were being used at school. It demonstrates a trend where teachers initially were selective in their use of the laptop, but over time, became increasingly confident, allowing students to use laptops across classes.

Table 5.10
Dialogue with Participant 11B on How Laptops Were Being Used at School

Year	Interviewer	Participant
First	How have you used your laptop at school?	Well, so far with the laptop it's been primarily for work that isn't, like, logical. For example, things like society and environment and ICT literacy, yeah, we've been using our laptops a lot for that sort of stuff but for more logical things like Maths, for example, we don't really. So it's a bit of a mixed bag.
First	Now that the first year draws to a close, how have you used your laptop for school?	Well, it's been interesting because it's at the same time beneficial and negative because in the beneficial way it's a lot faster to do things than in handwriting because typing's three, four times faster than handwriting in general. And, copying out stuff is easy; you just copy and paste it. There's the ability to easily get immediate access to fast amounts of information. And it's more the fact of speed more than anything else.
Second	How have you used your laptop at school in the last 12 months?	The laptop program has been ... it's been sort of concentrated to certain areas. Some teachers seem to despise the idea of using laptops in their classes or some teachers seem more open about the idea.
Third	How have you used your laptop at school in the last 12 months?	At school, the primary focus has been probably Internet searches. The teachers have been getting more and more into using it for assignments and the like, but it's still primarily used for Internet searches.

5.8.2 Views about enjoyment, questions and difficulties

This section of the questionnaire was concerned with: whether students enjoyed using their laptops, if there was something else they wanted to know about the laptops and did they have any difficulties using their laptops. Firstly, Item Six of the annual questionnaire required students to respond either *yes* or *no* to: "Is there something you really enjoy about using your laptop?” Both cohorts recorded a decrease in their enjoyment of using a laptop as shown in Figure 5.39. Cohort A decreased by 10.1 percentage points to 84.3% by the third year, and Cohort B fell by 16.7 percentage points to 68.4% by the third year. These data suggest that the enjoyment levels with the use of laptops over the three years gradually declined, as learning with laptops became standard for students.

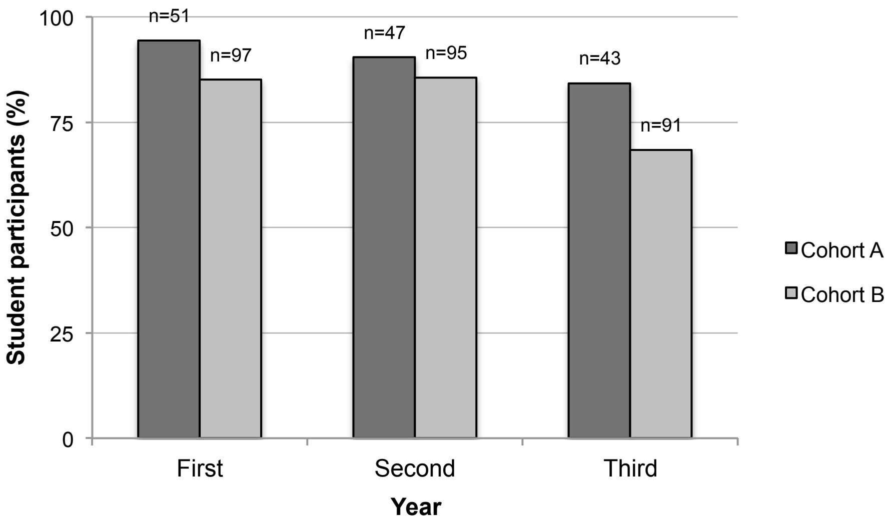


Figure 5.39. **Enjoyment levels using laptops over time.**

Students from both cohorts were requested to indicate in Item Seven whether there was something they would like to know more about when using a laptop (*yes,* or *no*). Students from both cohorts wanted to know more about their laptops from the first year to the second year. There was an increase of 7.1 percentage points for Cohort A (first year 35.2% to second year 42.3%), and an increase of 6.8 percentage points for Cohort B (first year 18.4% to second year 25.2%). However, in the third year, Cohort A decreased by 22.7 percentage points to 19.6% and Cohort B decreased by 10.2 percentage points to 15.0% (see Figure 5.40). Questions identified by both cohorts related to general use about applications and programs, ways to solve Internet connectivity issues, and how to troubleshoot for themselves.

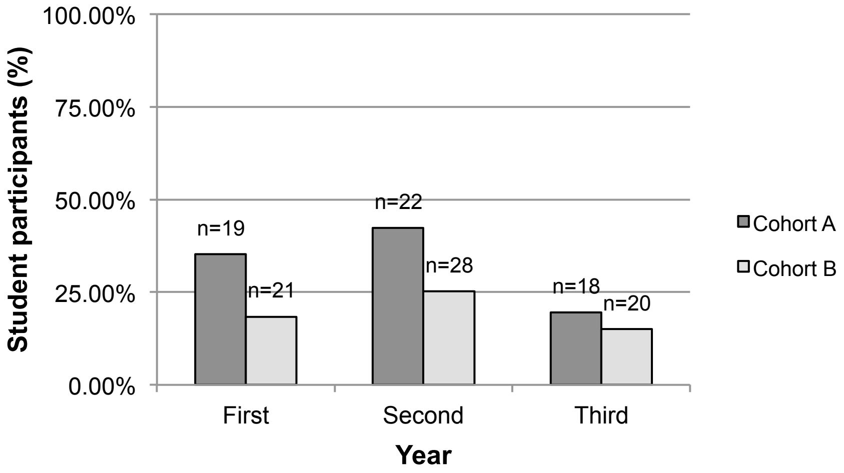


Figure 5.40. **Student participants wanting to know more about the laptop.**

Item Five of the questionnaire was concerned with finding out whether the student participants had any difficulties in using their laptops (*yes,* or *no*). Cohort A increased by 3.8 percentage points over the three years indicating 35.3% had a specific difficulty in using the laptop by the third year. Figure 5.41 shows that Cohort B had a decrease of 2.8 percentage points from the first year to the third year, with a total of 22.6% of students reporting a difficulty by the third year.

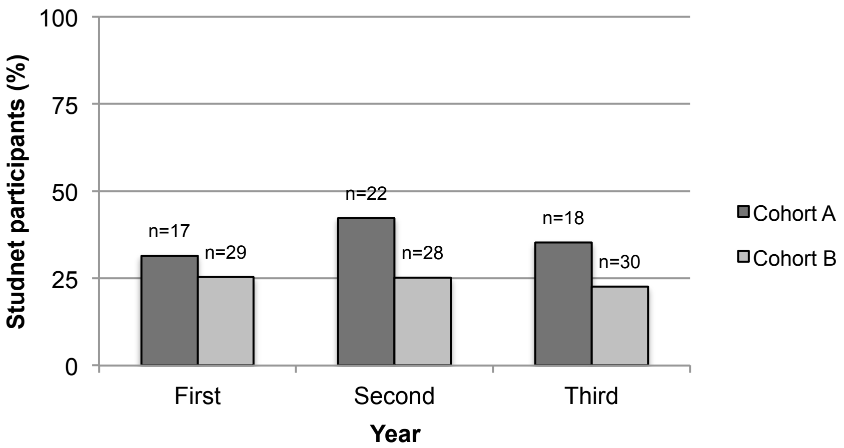


Figure 5.41. **Student participants' reported difficulties in the use of laptops.**

Responses within the survey questionnaire were examined in finer detail in the third year of the study. From the 108 (28 Cohort A and 75 Cohort B) responses to the questionnaire in the third year, the most frequently reported difficulties were related to the age and operability of the device including battery related issues. An example of this issue is shown by the view of the following student participants:

> The battery is getting bad and it doesn't last very long. (B472012)
>
> The laptop is excellent at doing everyday tasks; no extra things need to be added. The only main problem would be slowing of the laptops as they are almost three years old now. (B242012)

These difficulties suggest that schools implementing 1:1 laptop programs need to be aware of the possible maintenance issues related to the 'wear and tear' of any device over a three year period. In the third year the School undertook a battery audit of each laptop for both cohorts to determine diagnostic use information of each device.

5.9 Summary

Students enjoyed using laptops for learning and identified the laptop program as being an important part of their daily lives. The elements of the ICT capability continuum that rated highly were managing and operating, investigating and creating with ICT. There was evidence of students using ICT to communicate with teachers and peers for learning, yet it was predominately used outside of the School. Students demonstrated an increasing ability to use ICT for accessing information and developing knowledge. Students also reported a greater independence for learning with the use of laptops. These findings are consistent with the findings from other research (Hatakka et al., 2013; Lowther, Ross, & Morrison, 2003; Penuel, 2006; Won Hur & Oh, 2012).

Students believed classrooms had changed in a range of facets, primarily the access to ICT for learning, dealing with distractions, less collaboration and the variability of teaching styles when using laptops for learning. Understanding the specific transitions from both cohorts, demonstrated characteristics such as the cognitive and social development of young males. As Cohort A transitioned the level of distraction fluctuated whereas Cohort B reported the need to focus and stay on task. The novelty factor of the laptop had diminished and in turn reduced the level of distractions:

> Back in Year Seven and Year Eight, it did not seem like a big issue but now when we are in Year Nine we start to get the bigger picture and understand that if we do not do well then it is going to impact on us. (GF52012)

Students in the third year of the study demonstrated a higher level of proficiency in ICT competencies than in the first year according to the student questionnaire. Evidence of forms of higher order digital design mentioned during the annual interviews and observations further confirmed the higher level of ICT competencies. Students exhibited a strong reliance on the Web to research and solve problems, with Google being utilised the most. Web searching resonated with the students and removed the attitude of students finding excuses to not find information:

> Probably just having the laptops there and all the information that you need for it accessible rather than you've got to go – I don't know – ask your parents or wait to get the answer to find it somewhere else. You can just get it there on the Internet. (B122012)

Students exhibited a reluctant attitude towards asking adults for help and believed they had a superior skillset; further highlighting the theme of parent alienation. Students believed parents could not help and rarely sought help for laptop related issues. Students reported that the type of teacher providing a lesson determined the effectiveness of the 1:1 laptop program. Students perceived a combination of factors that had placed pressures on the effectiveness of the 1:1 laptop program and suggested a range of essential traits for a teacher in a 1:1 laptop classroom. These traits are discussed in Chapter Eight in discussing possible improvements for 1:1 laptop programs. The next chapter will focus on the views of parents in the 1:1 laptop implementation.

CHAPTER 6.
Findings: Parent Perceptions

6.1 Introduction

Chapters Four and Five focused on the teacher and student participants' views about the 1:1 laptop program. This chapter discusses parent perceptions. The discussion will focus on: (a) parent knowledge and use of computers; (b) time their son(s) spent using laptops; (c) views about student learning; (d) perceived impact on learning, engagement and motivation; and (e) monitoring laptop use. The emphasis of Chapter Six, is to examine critically parent data in relation to research question four: "What differences can be identified between junior and middle school implementation experiences in regard to research questions 1, 2, and 3?" However, the chapter also seeks to provide confirming/disconfirming evidence to deepen understanding of student and teacher perceptions of the 1:1 laptop program.

6.2 Parents' Perceptions of the 1:1 Laptop Program

The introduction of the 1:1 laptop program had a significant impact on parents. Parents perceived a distinct shift in the learning paradigm at the School, and this change in learning was met with some conjecture in respect to how 1:1 devices impacted on learning. This section explores parents' perceptions of the 1:1 laptop program starting with some background on their own ICT use.

6.2.1 Parent background information

Parents from both cohorts were asked to respond to the annual questionnaire for each of the three years of the study. At the conclusion of the first year questionnaire, themes pertaining to laptop use, gaming and inappropriate use of laptops arose as previously discussed in section 3.6.5.1 of Chapter Three (Methodology). Subsequently, additional items were added to the second year parent questionnaire; with no changes to the parent questionnaire in the third year. Table 6.1 shows the response rates for parents.

Table 6.1
Participant Response Rate for the Annual Parent Questionnaire

Cohort	Inception # %	First Year %	Second Year %	Third Year %
Parent Cohort A	62.5 (n=35)	87.5 (n=49)	80.4 (n=45)	82.1 (n=46)
Parent Cohort B	52.9 (n=72)	77.2 (n=105)	72.1 (n=98)	75.7 (n=103)

Note. Inception # = In the first year of data collection an initial data collection phase instituted at the commencement of the 1:1 laptop implementation (March / April).

Parents from both Cohort A and Cohort B were asked to respond to Item Nine of the annual questionnaire: "What computing platform do you use each day?" In the second year of the study, Item Nine was introduced to investigate whether parents' preferences for ICT might influence how students' use their laptops. Figure 6.1 shows the percentage of parent participants using their nominated platform.

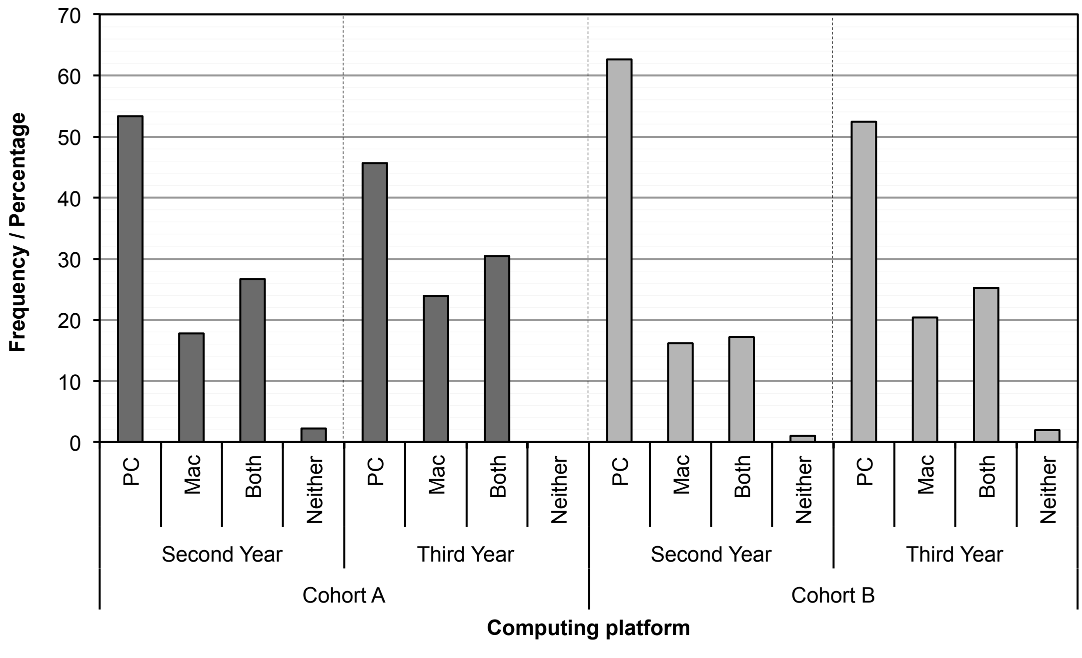


Figure 6.1. **Computing platform used by parents (Cohort A and Cohort B) for the second and third years of the study.**

Parents from both cohorts predominately used a PC in both the second year and third year. However, there was an increase of 6.1 and 4.2 percentage points in the Mac computing platform for both Cohort A and Cohort B parents respectively between the second year and third year. Some parents were interested in finding out more about the Mac platform in order to support their son:

> We were trying to work out what we could do so we went out and bought all Mac so we could actually understand the Mac system, and that's what happened to our house. (Parent Forum Year Three)

The introduction of the Mac platform at the School had shown signs of penetration into the families of the students. Parents were prepared to familiarise themselves with the Mac platform.

6.2.2 Parent ICT competence and perceptions of student use of laptops

Parents from both cohorts were asked to respond to the Likert-type scale in Item Six of the questionnaire for their own knowledge and use of computers as either: non-user, novice, intermediate or experienced. Table 6.2 displays cross tabulations of these three knowledge groups with Item One of the questionnaire: 'To what degree do you think that laptops are used in your son's school?'

Table 6.2
Cross Tabulation of Item Six of the Parent Questionnaire, Parent Knowledge and Use of Computers with Item One, Laptop Use at School

		Item1 - To what degree do you think that laptops are used in your son's school?					Total
Item	Type of user	Very little	Not enough	Correct amount	Too much	Don't know	
Item 6: Choose the expression that best represents your knowledge and use of computers	Novice	3.9%	0.0%	62.7%	21.6%	11.8%	100%
	Intermediate	0.5%	2.7%	65.9%	23.6%	7.3%	100%
	Experienced	0.0%	9.0%	62.9%	21.6%	6.6%	100%
Total		0.7%	4.8%	64.4%	22.6%	7.5%	100%

Note. The data above was available only in the second and third year of the study.

Most parents (64.4%) indicated the laptops were being used the '*Correct amount.*' Nearly a quarter of parents (22.6%) stated that laptops were being used too much. Of the three groups of parent users, the novice group recorded the highest percentage in the '*Don't know*' option (11.8%). The data suggests that parents with lower than average ICT knowledge and skills are more likely to feel uncertain about their son's laptop use at school and therefore perhaps more disconnected from their son's learning.

Parents in the study were to a large extent, unaware of how laptops were used in classes for learning. However, many indicated that their sons used the laptop for a range of activities at home mostly involving social media, gaming and music. Most parents and educators are keen to make good educational use of ICT to improve student engagement and learning (Selwyn & Husen, 2010).

Figure 6.2 shows the annual mean scores for parent views about the extent of time their son's spent using laptops whilst at the School. Parents from both Cohort A and Cohort B recorded a three year mean score of 4.0 ± 0.1 by consistently ticking the '*The correct amount*' option.

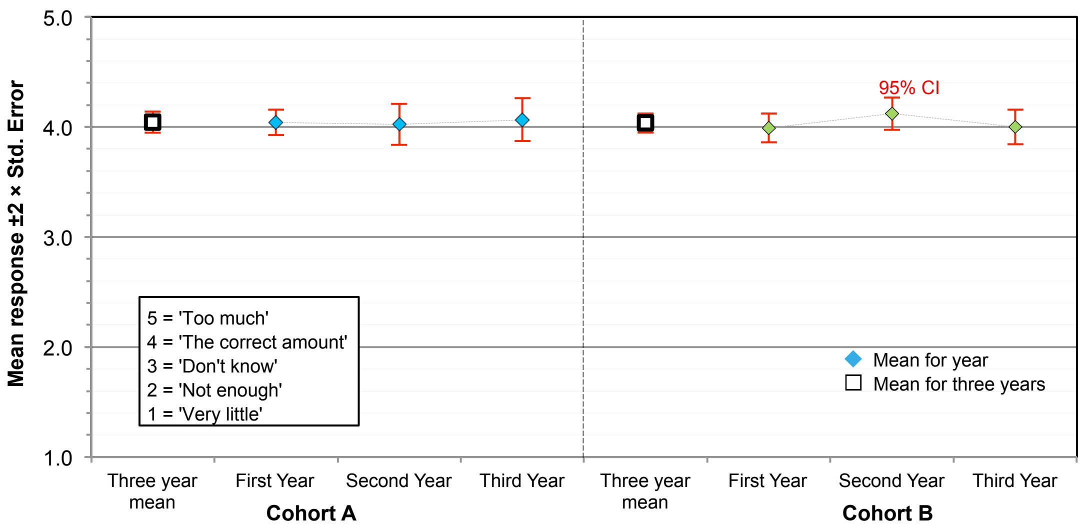


Figure 6.2. **Mean responses by parents to Item one: To what degree do you think laptops were used in your son's School.**

Figure 6.3 presents the mean scores for parents in both Cohort A and Cohort B relating to the amount of time their sons used laptops at home for school work. Cohort A recorded a three year mean score of 3.5 ± 0.2, whilst Cohort B recorded a higher mean score of 3.8 ± 0.1 (Ind. Samples t-test, $p < 0.01$). The mean scores for these three years indicate a gradual and statistically significant increase in the frequency in which both cohorts used their laptops at home (One-Way ANOVA, Cohort A: $p < 0.05$, Cohort B: $p < 0.01$).

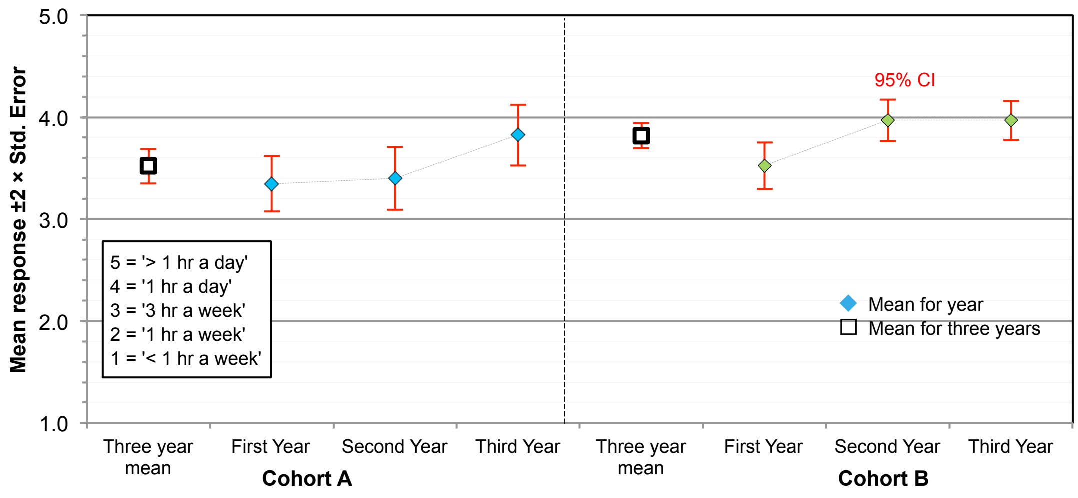


***Figure 6.3.* Parent mean estimates of the amount of time their sons spent at home using their laptops for school work.**

Judgments pertaining to the amount of time students spend on learning tasks that involve ICT are subjective. What is “too much” for one parent may be “not enough” for another. However, qualitative data from the parent questionnaires reveals positive and quite sophisticated understandings of the 1:1 implementation:

> The current laptop program complements the school curriculum and provides the students with more opportunity and access for research and information gathering. (Parent Cohort A, Second Year)

> The 1:1 laptop program has provided a range of opportunities for my son to access greater amounts of knowledge and in turn, help with his understanding in a range of learning areas. (Parent Cohort B, Third Year)

Item Four of the parent questionnaire required parents from both cohorts to rate their son’s ability using a laptop. A Likert-type scale of 1 (*Poor*), 2 (*Fair*), 3 (*Competent*), 4 (*Very good*), and, 5 (*Outstanding*) was used.

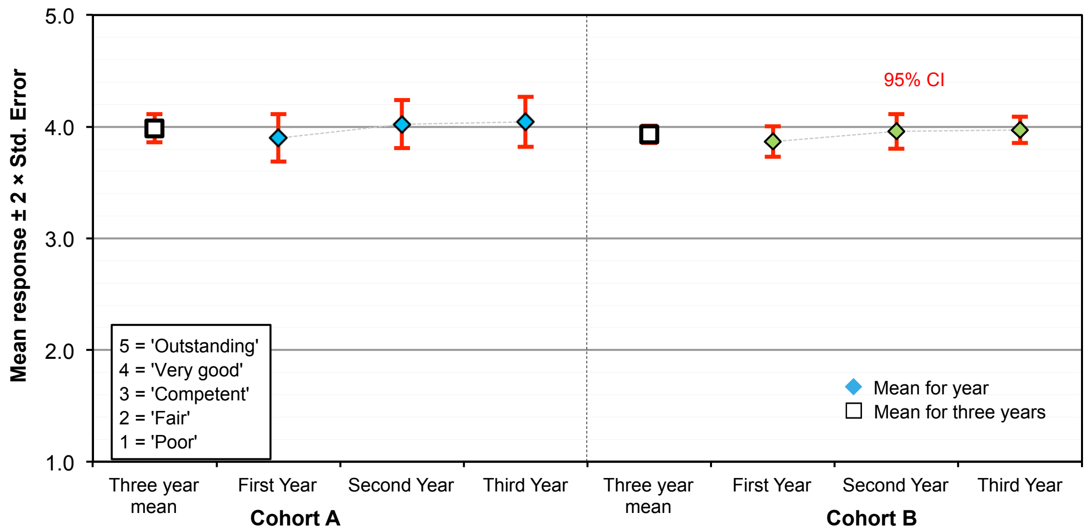


***Figure 6.4.* Mean responses by parents to Item four: First year, second year and third year parent mean scores of son's ability with using a laptop.**

Parents from both cohorts indicated their son's were 'very good' in terms of their ability of using their laptops. Cohort A recorded a three year mean of 4.0 ± 0.1 and Cohort B recorded a three year mean of 3.9 ± 0.1. As seen above in Figure 6.4, both cohorts recorded little change in each year of the study (however this increase was not statistically significant in either cohort).

6.2.3 Parent views about student learning

Item five of the parent questionnaire asked them to gauge the extent to which they agreed with a range of statements about their son's education at the School. These were in the form of 25 Likert items, part of a Likert-type scale: 1 (*Strongly disagree*), 2 (*Disagree*), 3 (*Don't know*), 4 (*Agree*), 5 (*Strongly agree*). Independent samples t-Tests were conducted for each of the 25 Likert items to determine any statistical differences between parent perceptions from Cohorts A and B. Difference of the mean for thirteen of the Likert items were statistically significant and are now discussed in more detail.

Figure 6.5 shows the mean scores for Item Five (d): "My son is usually assessed on the work he does rather than by test and exams." Cohort A recorded a three year mean score of 3.5 ± 0.1, significantly greater than that of Cohort B, 3.2 ± 0.1 (Ind. Samples t-test, $p < 0.01$).

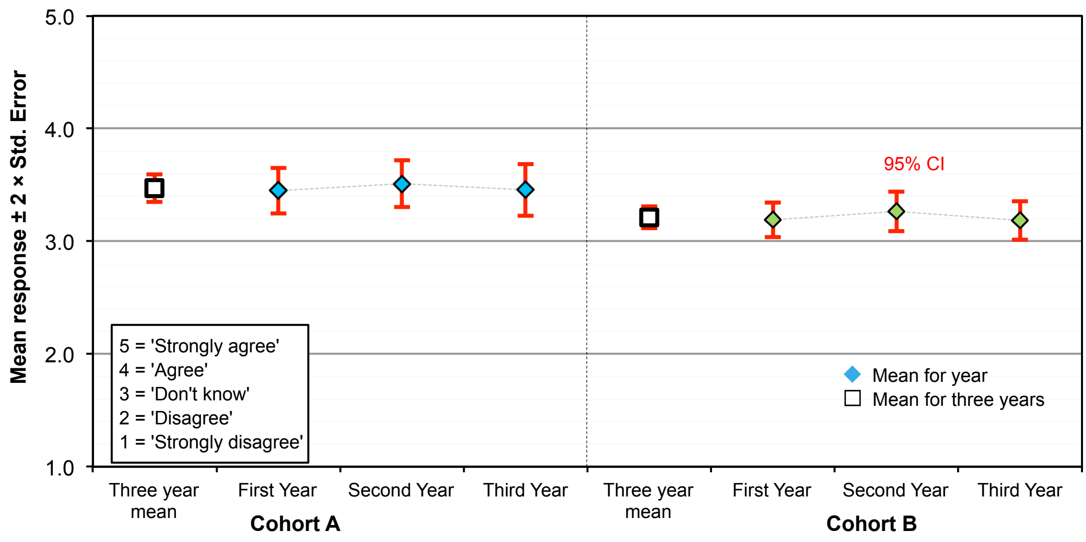


***Figure 6.5.* Mean responses by parents to Item five (d): My son is usually assessed on the work he does rather than by test and exams.**

These mean scores are low considering that one of the reasons for the School introducing a 1:1 laptop program was to customise learning tasks using ICT. Parents for Cohort A generally chose between the options of '*Don't know*' and '*Agree*', whereas parents from Cohort B mainly resonated with the '*Don't know*' option.

Figure 6.6 shows the mean scores for Item Five (i): "Laptops are used at school to help my son to do work faster, more accurately or better in some way." Cohort B increased between the first year (3.3 ± 0.2) to third year (3.6 ± 0.2).

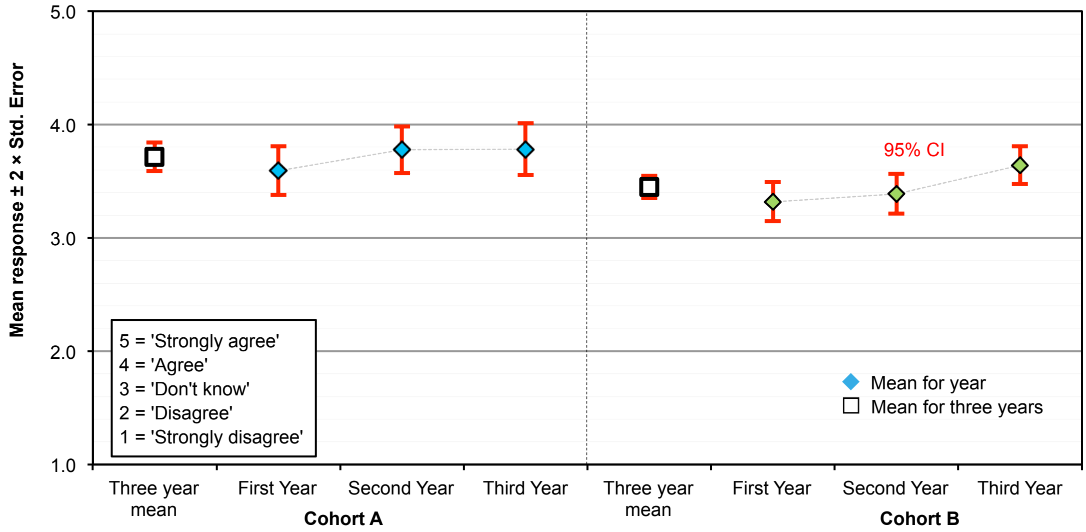


***Figure 6.6.* Mean responses by parents to Item Five (i): Laptops are used at School to help my son to do work faster, more accurately or better in some way.**

The steady increase in mean scores for Cohort B demonstrates an improvement about how ICT was being used. Parents perceived that laptops made their sons more efficient and productive:

> I thought the laptop was challenging them with many different things through the different projects and school related tasks. The boys were doing lots of stuff, and they didn't even really realise that they were becoming more efficient in completing these tasks by using their laptops. (Parent Cohort A, Third Year)

This view held by parents indicates improvements in digital literacy skills. Digital literacy is discussed in Chapter Eight.

Figure 6.7 presents the annual mean scores for Item Five (m): "My son often seeks ideas from others at school or home." A three year mean of 4.0 (Cohort A) and significantly lower 3.6 ± 0.1 (Cohort B) were observed (Ind. Samples t- test, $p < 0.01$). Parents from Cohort A generally agreed with the item.

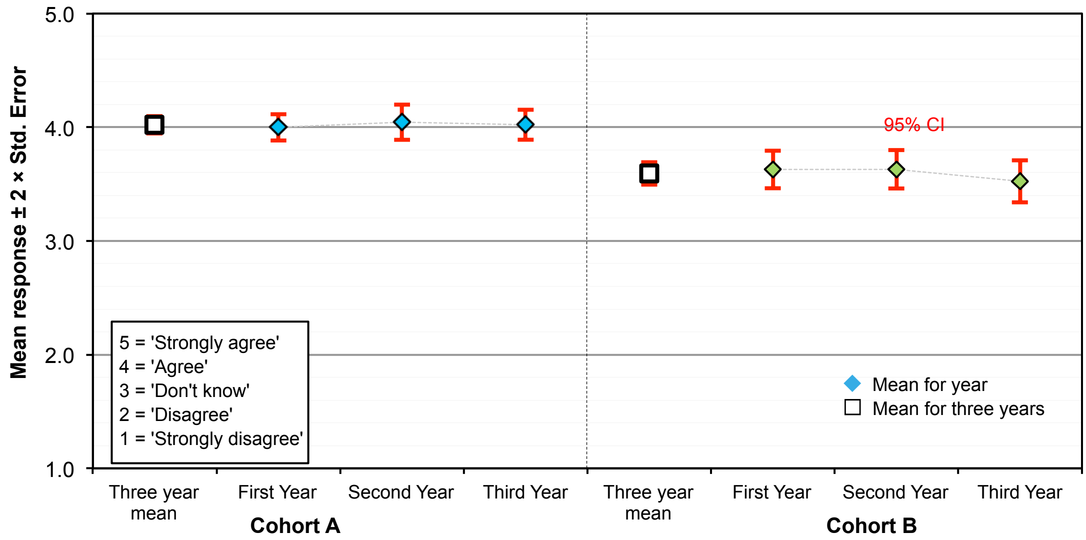


***Figure 6.7.* Mean responses by parents to Item five (m): My son often seeks ideas from others at school or home.**

Figure 6.8 displays the mean scores for Item Five (n): "My son often does work in groups in class." Cohort A recorded a three year mean score of 4.0 ± 0.1 and Cohort B, 3.7 ± 0.1, significantly lower (Ind. Samples t-test, $p < 0.01$).

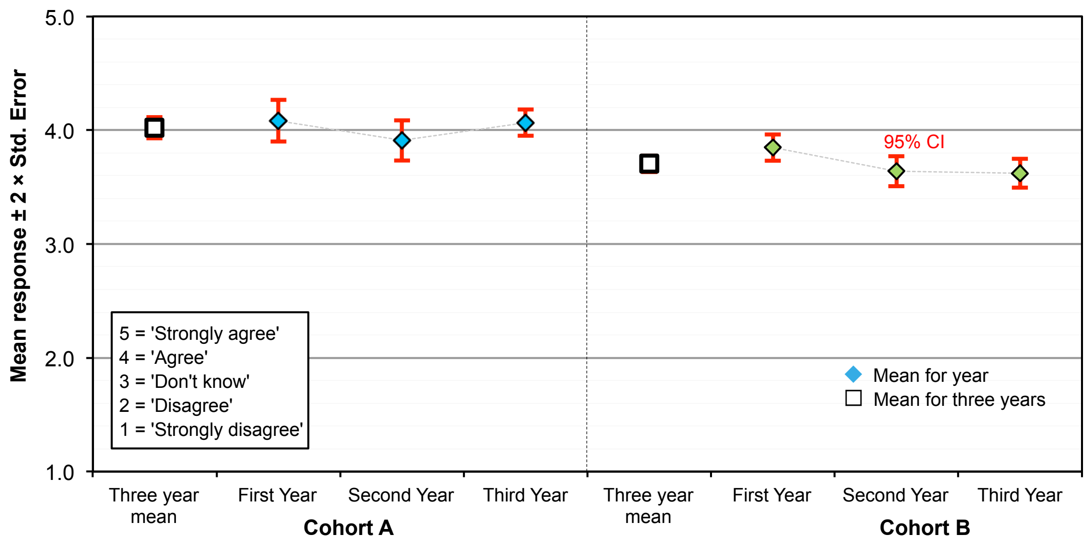


***Figure 6.8.* Mean responses by parents to Item five (n): My son often does work in groups in class.**

Cohort B mean scores decreased between the first year (3.9 ± 0.1) to third year (3.6 ± 0.1) indicating a significant (One-Way ANOVA, $p < 0.01$) decrease in parent perceptions of the amount of collaboration in class. This diminution could be linked to middle school curricula or approaches, which emphasize more individualistic tasks in contrast to junior school classrooms.

Figure 6.9 shows the mean scores for Item Five (o): "My son often has work specially organised for him." Both Cohort A (3.0 ± 0.2) and Cohort B (2.5 ± 0.1) recorded low three year mean scores. The difference between the cohorts was statistically significant (Ind. Samples t-test, $p < 0.01$).

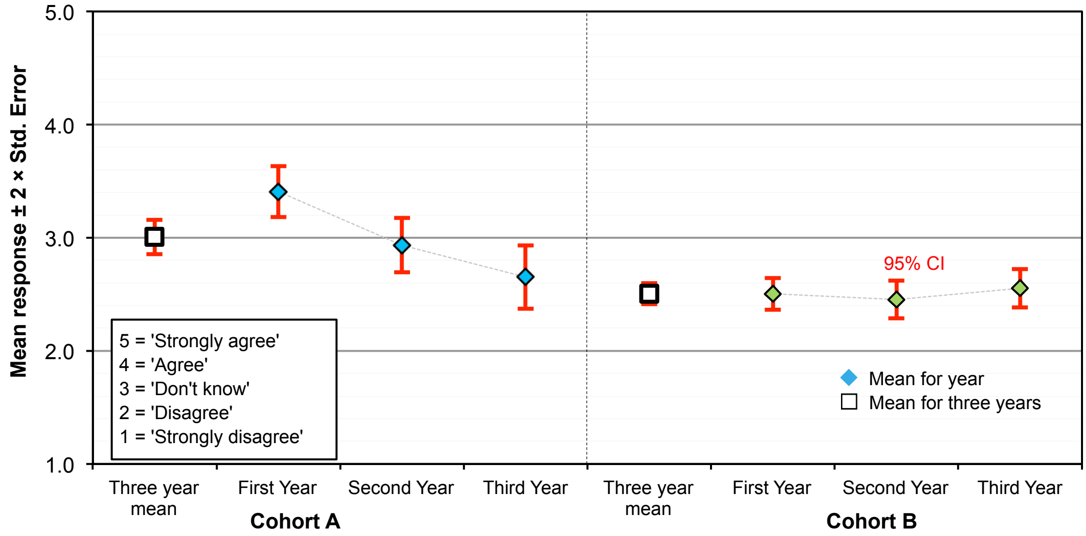


***Figure 6.9.* Mean responses by parents to Item Five (o): My son often has work specially organised for him.**

Another rationale for introducing laptops at the School was for the purpose of tailored learning for students; however, the data suggests that tailoring learning did not eventuate to any great degree. Both cohorts of parents were not convinced laptops provided their sons with work specially organised for them. Cohort A, who were in a junior school setting for the first and second year, experienced a consistent and significant (One-Way ANOVA, $p < 0.01$) decline in mean score from the first year to third year. The transition from junior to middle school indicates parents believed there was less work specially organised for their sons in a middle school setting.

Figure 6.10 shows the mean score for Item Five (p): “The School provides my son with plenty of opportunities to use his laptop.” Parents from both Cohort A and Cohort B in the main agreed with this Likert item recording respective three year mean scores of 4.2 ± 0.1 and 4.0 ± 0.1. These data suggest that parents believed the School provided adequate opportunities for their sons to use their laptops.

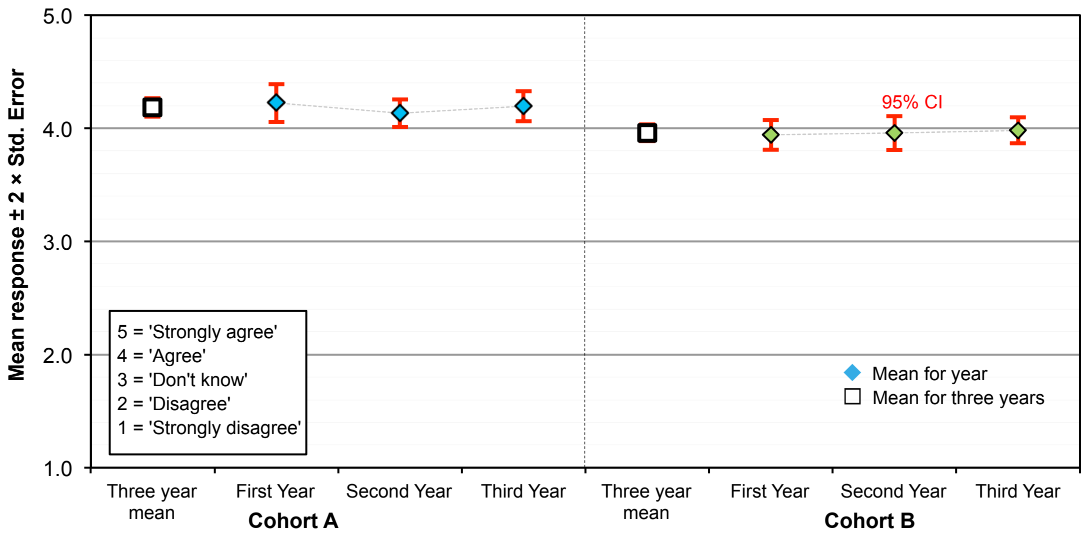


***Figure 6.10.* Mean responses by parents to Item Five (p): The School provides my son with plenty of opportunities to use his laptop.**

Figure 6.11 shows the mean score for Item Five (q): “The School gives me plenty of information about what my child is expected to do with his laptop.” The three year mean score for Cohort A was 3.5 ± 0.2 whilst Cohort B recorded a significantly lower mean score of 2.9 ± 0.1 (Ind. Samples t-test, $p < 0.01$).

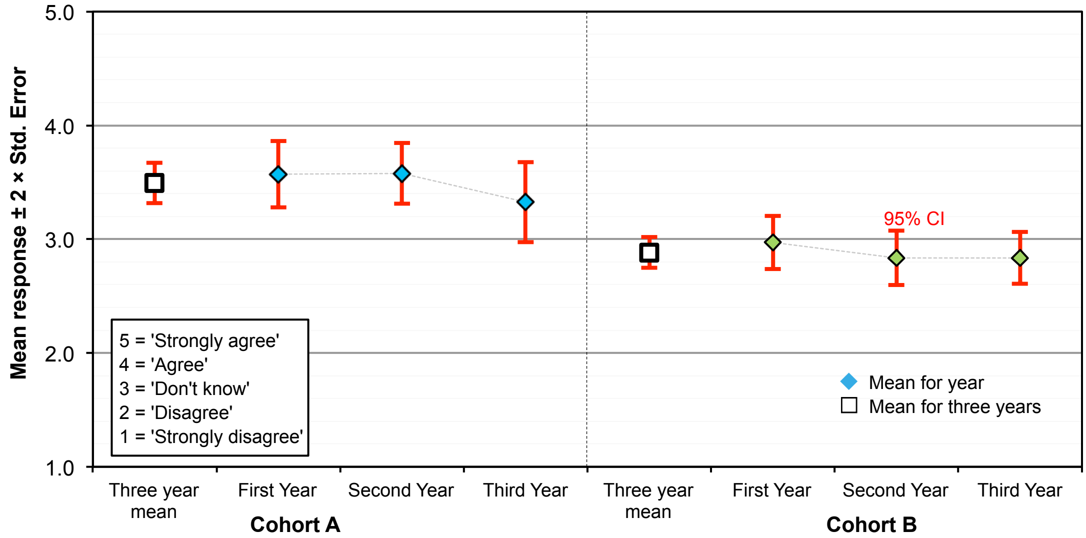


***Figure 6.11.* Mean responses by parents to Item Five (q): The School gives me plenty of information about what my child is expected to do with his laptop.**

These results show stark differences between Cohort A and Cohort B on the provision of information about the expectations of using laptops for learning. Parents from Cohort B (middle school) were mainly situated in the '*Don't know*' option whereas parents from Cohort A tended towards the '*Agree*' option. There are undoubtedly opportunities for the School to enhance the provision of information about what students are expected to do when using laptops for learning.

Figure 6.12 shows the mean score for Item Five (r): "The laptop program has given my son the opportunity to become more creative." The figure shows three year mean scores of 4.1 ± 0.1 for Cohort A and 3.7 ± 0.1 for Cohort B, significantly lower (Ind. Samples t-test, $p < 0.01$).

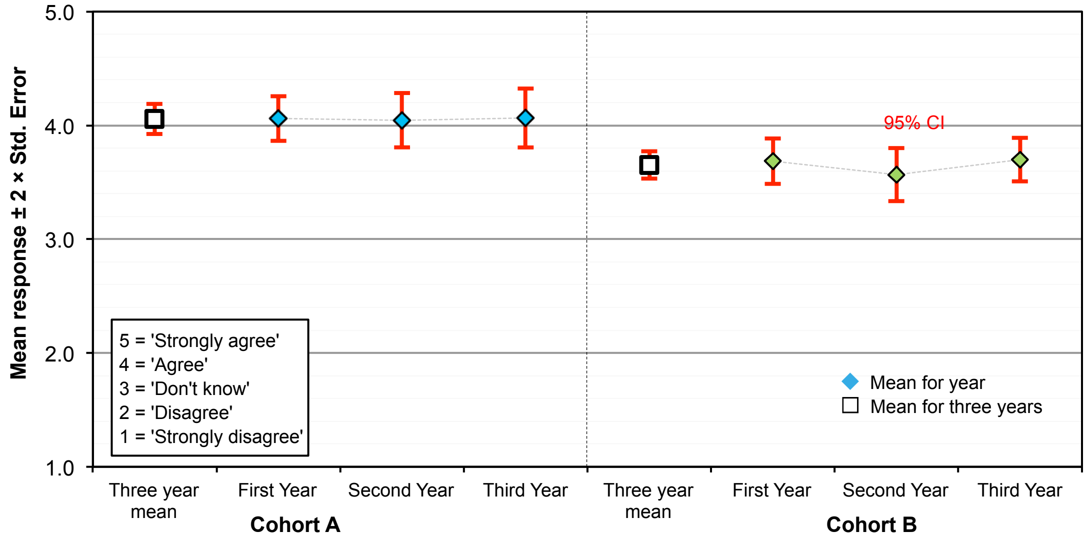


Figure 6.12. **Mean responses by parents to Item Five (r): The laptop program has given my son the opportunity to become more creative.**

Parents from both cohorts believed their son's creativity had improved since the implementation of the laptops. The following excerpt from a Cohort B parent participant is an example of this view:

> I think one of the other things it does do, you could say it's lower order, but it's actually valuable, is to be able to convey their creative side. Whereas perhaps on pen and paper they wouldn't be able to do that. If you give a presentation like an iMovie and then embed that within PowerPoint or even some other form, then you bring over the top a music track and maybe the text, that's a fairly complicated array of skills, and they're doing that now. Their creativity has definitely improved. (Parent Cohort B, Second Year)

Improvements in students' creativity may be an unplanned outcome of the 1:1 laptop implementation as the School did not either assess or report on creativity. There may be opportunities for schools to capture creativity outcomes both in multimedia and in the use of ideas and words, by developing assessment instruments and reporting methods explicitly targeting this construct.

Figure 6.13 presents the mean scores for Item Five (s): "The laptop program has given my son the opportunity to become more inquiring." Cohort A recorded a three year mean score of 3.9 ± 0.1 and Cohort B, 3.6 ± 0.1.

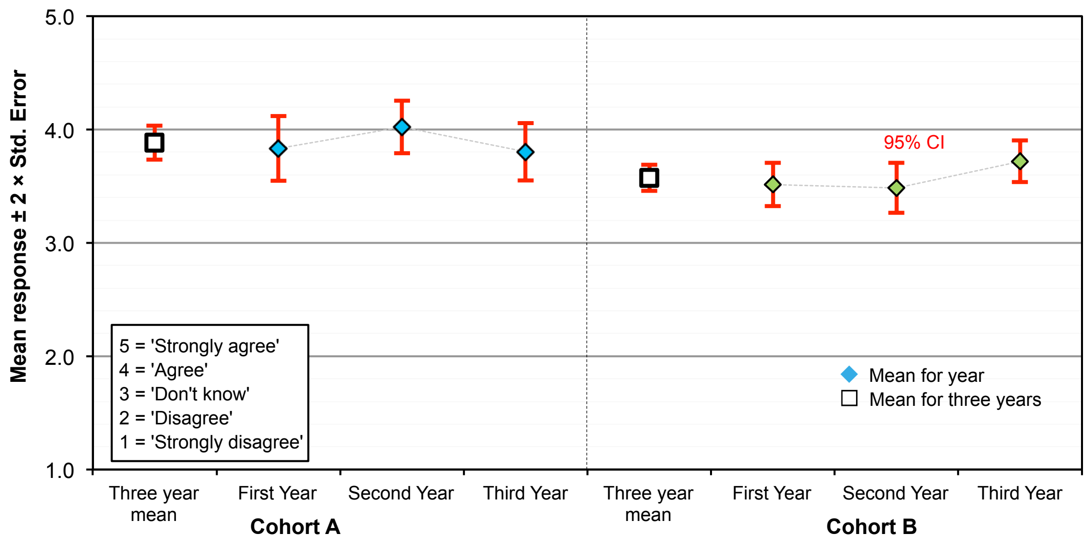


***Figure 6.13.* Mean responses by parents to Item Five (s): The laptop program has given my son the opportunity to become more inquiring.**

Whilst their son was in the Junior School, the following excerpt from the second year Cohort A parent forum reflects this increase:

> I feel that my son now has the ability to access more information than previously. He was reluctant to go to the library whereas now he just searches the information. It is as if his knowledge levels in a range of areas have improved, whereas previously he was reluctant to find out information. (Parent Cohort A, Second Year).

These results indicate that information retrieval could be an area of knowledge/skill deficit that may need remedy as students enter middle school.

Figure 6.14 displays the mean scores for Item Five (t): "The laptop program has given my son the opportunity to become a more active citizen in our community." Both Cohort A (2.9 ± 0.2) and Cohort B (2.5 ± 0.1) recorded low three year mean scores.

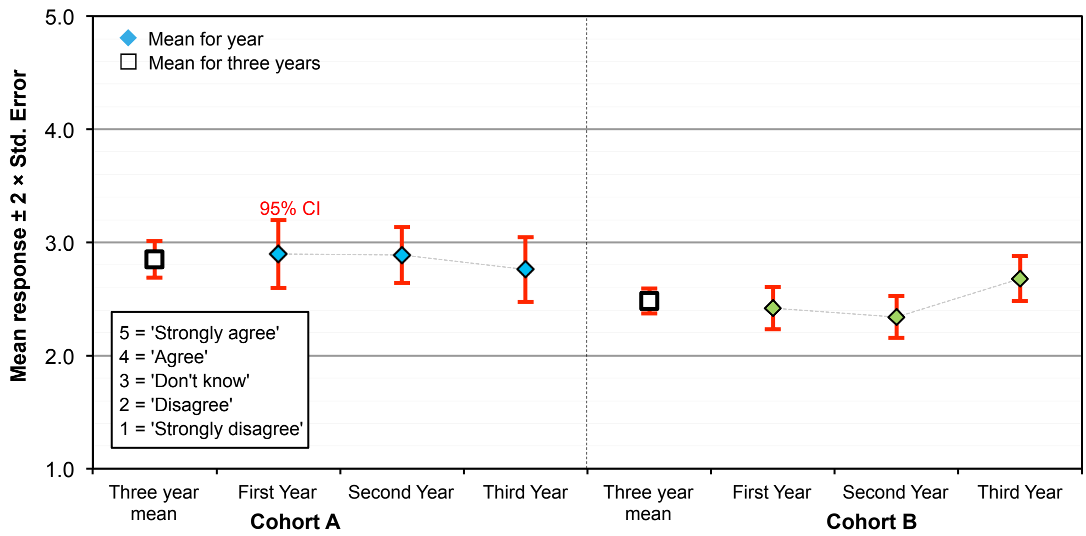


Figure 6.14. **Mean responses by parents to Item Five (t): The laptop program has given my son the opportunity to become a more active citizen in our community.**

The low mean scores seem to be at odds with one of the core values of the School, being service to others. The School, which is part of the Edmund Rice ministry, connects with various community and international organisations. However, mean scores from both cohorts indicated that parents did not think laptops were being used by their sons to become active citizens within the community.

Figure 6.15 shows the mean scores for Item Five (u): “My son spends too much using his laptop for gaming.” A three year mean score of 2.9 ± 0.3 was recorded for Cohort A and 3.4 ± 0.2 for Cohort B.

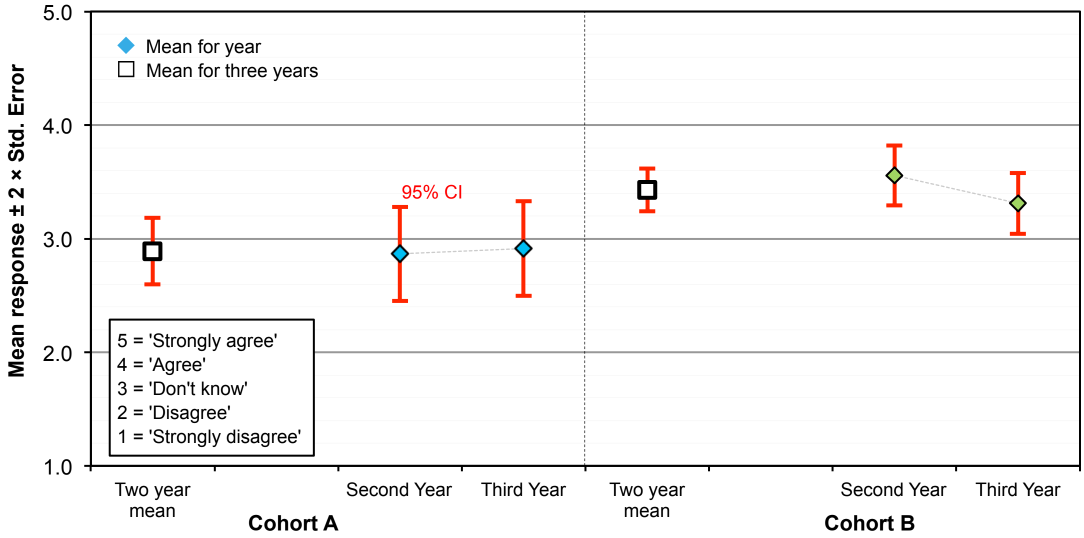


Figure 6.15. **Mean responses by parents to Item Five (u): My son spends too much using his laptop for gaming.**

As discussed in the methodology chapter, Item Five (u) was introduced in the second year of the study as a reaction to parent concern about excessive gaming taking place on laptops in the first year.

Figure 6.16 displays the mean scores for Item Five (v): "My son uses his laptop to access inappropriate sites." Parents from both cohorts recorded low mean scores, with Cohort A recording a two year mean score of 1.9 ± 0.2 and Cohort B, recording a mean of 2.2 ± 0.1.

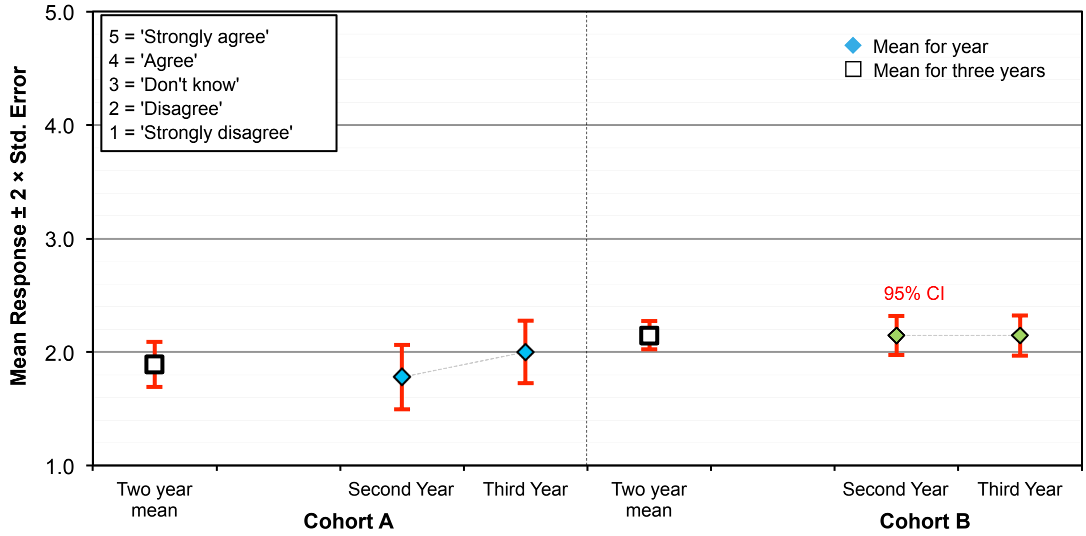


***Figure 6.16.* Mean responses by parents to Item Five (v): My son uses his laptop to access inappropriate sites.**

Parents from both cohorts expressed their concern at the Parent Forum at the conclusion of the first year about their son's capacity to access inappropriate sites. The following excerpt provides an example:

> I am concerned about the accessing of age inappropriate sites by my son. He tries to tell me that he can go on Facebook and view some of the content on YouTube. Pornography is another area I am concerned about because of the ability or temptation now that he has his own laptop (Parent Cohort B, First Year)

However, since the introduction of e-Safe monitoring by the School parents were evidently more comfortable with the School's risk management approach and most did not believe their son was accessing inappropriate sites. The introduction of monitoring strategies by the School network was part of a committed approach by the School to ensure the safety of the students. The School was also dedicated to the objective of *educating* the students about ethical use of ICT.

Figure 6.17 shows the mean scores for Item Five (w): "When doing assignments my son has a cut and paste mentality when using his laptop." Cohort A recorded a two year mean score of 2.7 ± 0.2 and Cohort B, recorded a mean of 2.6 ± 0.1.

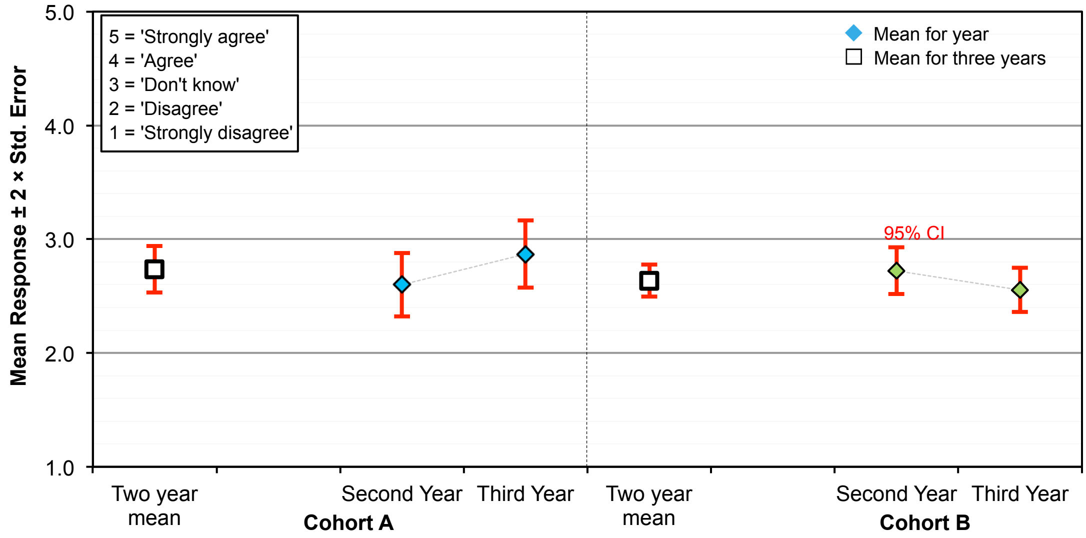


Figure 6.17. **Mean responses by parents to Item Five (w): When doing assignments my son has a cut and paste mentality when using his laptop.**

Most parents from both cohorts tended to disagree with this statement. The quantitative data seems at odds with qualitative data collected at the third year Parent Forum, where parents from Cohort B expressed their concern about a cut and paste mentality:

> The only one thing that really concerns me is the cut and pasting, because, I mean, we used to do it with a pen, you'd copy it out and just when I read some of their assignments I'm thinking, wow, that's good, but I realised, because my wife says, 'Oh, that's cut from there, and that's pasted there.' So I suppose it's no different from when we were at school, you know, a bit of plagiarism or whatever, it's just a different format. (Parent Cohort B, Third Year)

It is interesting that parents admitted to plagiarizing when they were at school. On the one hand, it was a concern, but on the other, if parents were aware their children were cutting and pasting when completing assignments, they could at least do something about it.

6.2.4 Parent views of the impact on learning, engagement and motivation

Parents who perceived that their son spent too much time on the laptop were often critical of the types of activities in which their son engaged. A few parents reported an "obsession" with non-school related activities, for example:

> My son is obsessed with using his computer purely for non learning activities, Facebook, games, and communication. He always hides behind his laptop. He must learn or do some work but instead plays and communicates hours on end if he could. (Parent Cohort B, Inception)

This comment is indicative that some parents were concerned with their son's off task behaviours when they should have been using their laptops for learning. Perhaps, one of the reasons why some parents felt alienated from their son's education, as a result of the 1:1 laptop implementation.

Gaming in particular was an ever-present concern across the two cohorts. The parent questionnaire included an open ended qualitative question (Item 18: 'Do you have any comments about the program? If yes, please comment'). Parents used this item to share their views about gaming and the types of distractions linked with laptop use at school and home:

> Need to make sure boys have no access to gaming. They are clever, not just them in particular, their friends are clever too or big brothers. They seek ways of getting onto gaming sites where parents do not know if it is a gaming site. (Parent Cohort A, Second Year).

> I feel that there is too much distraction created by the laptops in class. I am continually told by my son about boys playing games, and mucking around on their laptops instead of listening and working. (Parent Cohort B, Second Year)

This concern is consistent with research from Kerawalla and Crook (2002) who found that computer gaming took priority over students writing, drawing and completion of homework. Parents were also aware that the laptops were used to investigate and present information but were concerned about the depth of research and the ability to complete handwritten tasks. For example:

> Students should spend less time worrying about the appearance as opposed to the content. Teach kids how to research ethically and move away from cutting and pasting large volumes to complete set tasks. (Parent Cohort A, First Year)

> I am concerned that my son's ability to handwrite has slowed down to a detrimental level. He found himself unable to complete his NAPLAN English writing assessment. It concerns me that he may not be practising handwriting enough. Whilst exams are still to be handwritten, the boys need to practice this skill as well. (Parent Cohort A, First Year)

This feedback indicates that parents were concerned about the depth of learning taking place. There was also a consistent view of the importance of their son's ability in handwriting, particularly for tests or assessments, which did not require laptops.

The introduction of the laptop program changed the teaching and learning dynamics in the classroom. Teachers moved from being a teacher to more of a facilitator. With this shift, teachers were required to deal with issues arising from an increased temptation for students to be off-task. Interviews and classroom observations that took place in the three years of the study indicated there was some off-task behaviour that was not only being noticed by parents, but also by students:

> I think the laptop program is great, and I think it enhances our learning each day. At times, we do take short cuts, and it creates sloppiness in our work when we want to play games and do things like Facebook instead of doing my homework. (Student Cohort B, Second Year)

Parent feedback tended to focus on their disconnect with the digital medium where they perceived that they were not keeping up with their son's use of ICT. The main concern shared by parents was a lack of clarity in schoolwork use on laptops and to what standard? Parents, particularly from Cohort B, also felt that it was hard to understand where their son was at in relation to their overall understanding of the curriculum, for example:

> I would like my son to have access to hard copy manuals, like it used to be, so I can have a better understanding of the overall material related to a subject, and I can work with him to consolidate the concepts done at school. The practice of having all homework and manuals electronically available only is severely limiting my capacity of understanding the overall picture of where my son is in a subject matter. (Parent Cohort A, Third Year)

> I see far less of what he is doing in respect to homework and assignments. Much of the work is supposedly done at school. It is more difficult to monitor his progress with homework and progress on assignments. (Parent Cohort B, First Year)

> I would like to see regular (maybe one or two times a year) information sessions regarding the laptops and how they are being used for lesson work. I feel that I don't have the same 'hands on' knowledge about what my son is doing now that it's all done on a laptop. … I feel rather 'distant' to his learning in this regard though. (Parent Cohort B, First Year)

These views further reinforce the theme that some parents felt a sense of detachment or alienation with their son in using the laptop including the extent to which it impinges on their home life:

We feel that the use of a laptop for our son's school work has alienated us as parents from following our son's progress through his subjects, homework and achievements. We have found it very difficult to monitor the Internet use of the laptop at home and in our circumstances, it has become more of a distraction than an aide for learning at home. (Parent Cohort B, Third Year)

This sentiment indicates that the device itself has an inherent potential to form a barrier between parent and student. This is consistent with the results of a study of 400 Australian parents (Green, Brady, Olafsson, Hartley, & Lumby, 2011) which found that 55% of parents felt they needed to do more in relation to their child's Internet use. The views expressed by parents reinforce the underlying theme of parent alienation or a 'digital divide' with their son. This alienation is discussed further in the Chapter Eight, Discussion.

At the conclusion of the second and third years of the study, parents were asked to indicate the level of change they had witnessed or experienced since the introduction of the 1:1 laptop program. A Likert-type scale, divided into three types of impact: '*negative*', '*no impact*' and '*positive*', for Item 12: "Impact on your son's learning since the laptop program", as shown in Figure 6.18.

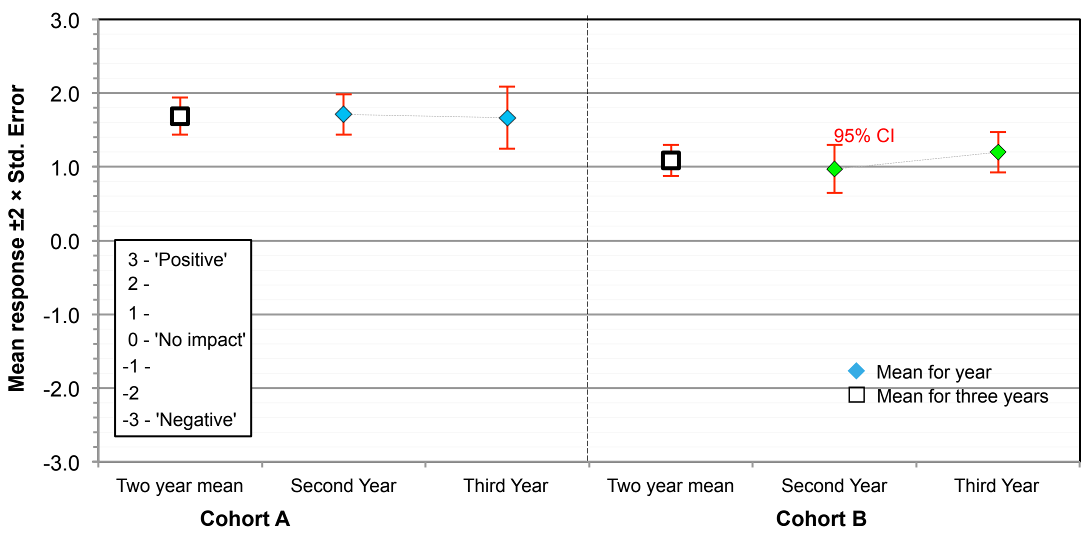


***Figure 6.18.* Mean responses by parents to Item 12: Impact on son's learning since having a laptop.**

Overall, Cohort A parents perceived a fairly positive impact, recording an overall mean of 1.7 ± 0.3. In contrast Cohort B recorded an overall mean of 1.1 ±

0.2, significantly lower (Ind. Samples t-test, $p < 0.01$). Parents in Cohort A were more positive about their response to the impact on learning since the implementation of the laptop program.

Similarly to change in learning (Item 12), parent participants were asked to respond to the same Likert-type scale for Item 13: "Impact on your son's engagement (towards learning) since he received his laptop" as seen in Figure 6.19.

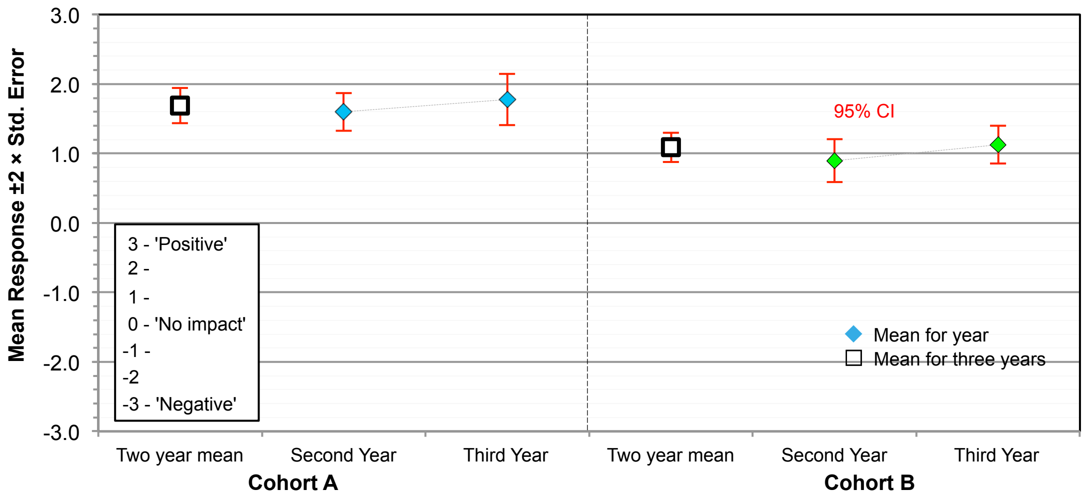


Figure 6.19. **Mean responses by parents to Item 13: The impact on your son's engagement (towards learning) since he received his laptop.**

Parents in Cohort A recorded an overall mean of 1.7 ± 0.3, whilst parents in Cohort B recorded a mean of 1.1 ± 0.2, significantly lower (Ind. Samples t-test, $p < 0.01$). Parent perceptions about their son's engagement towards learning since receiving a laptop, was, therefore, reasonably positive.

Table 6.3 presents a cross tabulation of Item Six (parent knowledge and use of computers) with Item 13: "The impact on your son's engagement (towards learning) since he received his laptop."

Table 6.3
Parent Participant Responses: Engagement (Towards Learning) Since he Received his Laptop Cross-tabulated with Parent Self-reported Knowledge and Use of Computers

Item number	User	Item 13: The impact your son's engagement (towards learning) since he received his laptop has been: -3	-2	-1	0	1	2	3	Total
6: Choose the expression that best represents your knowledge and use of computers	Novice	2.9%	0.0%	5.9%	17.6%	23.5%	35.3%	14.7%	100%
	Intermediate	3.7%	3.0%	11.1%	10.4%	23.0%	36.0%	13.3%	100%
	Experienced	0.0%	2.6%	5.1%	14.5%	23.1%	39.3%	15.4%	100%
Total		2.1%	2.4%	8.0%	12.9%	23.1%	37.3%	14.3%	100%

A total of 74.7% of parents responded in a positive way about the impact of their son's engagement towards learning since receiving a laptop. There were 12.9% of parents who were neutral in their response, and 12.5% indicated the laptops had a negative impact on their son's engagement towards learning. The cross tabulation did not uncover a relationship between parents' knowledge and use of computers, and their perceptions of the extent to which the 1:1 laptop program engaged their son in learning.

Figure 6.20 shows the parent participant responses to Item 14: "My son's motivation (towards learning) prior to the introduction of the 1:1 laptop program" (1 = *low* to 5 = *high*) as a mean for each year of the study.

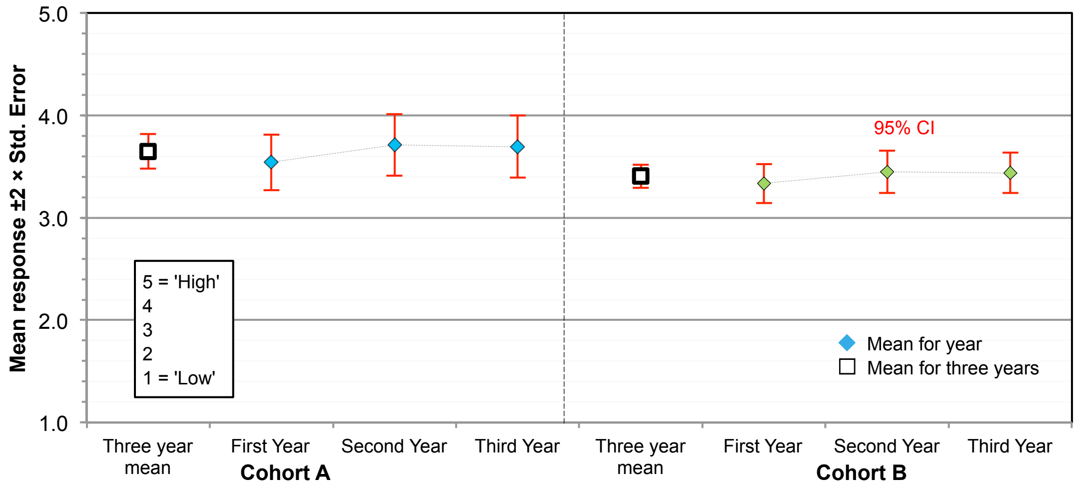


Figure 6.20. **Parent participants' three year mean score responses to their son's motivation (towards learning) prior to the introduction of the 1:1 laptop program.**

Figure 6.21 shows the parent participants' responses to Item 15: "My son's current level of motivation (towards learning)" as a mean for each of the three years of the study.

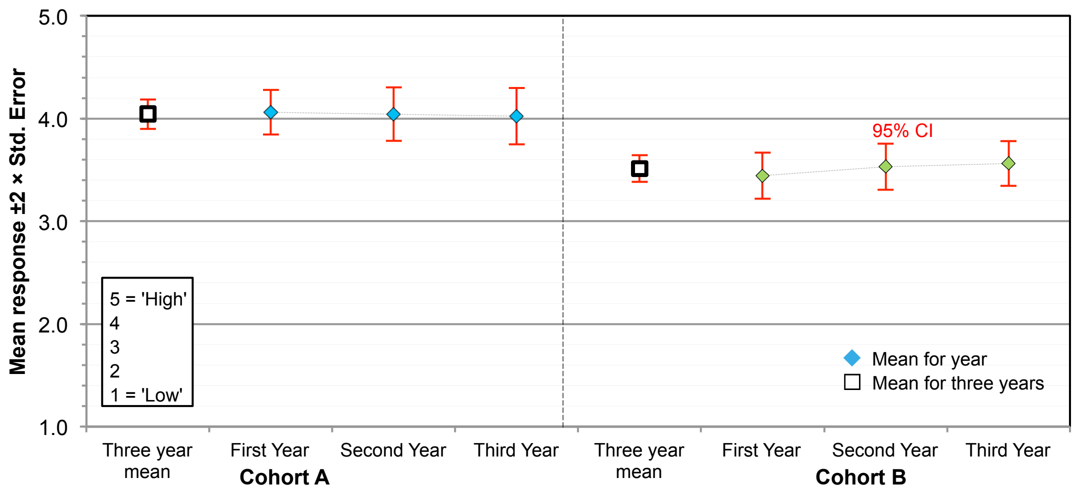


Figure 6.21. **Parent participants' three year mean score responses to their son's current level of motivation (towards learning).**

Compared to previous motivation levels (prior to the laptop implementation), parents from both cohorts appeared to believe that motivation levels had increased with the introduction of the 1:1 laptop program. This belief is consistent with the research of Keengwe et al. (2012) who reported learning with laptops can lead to increased motivation.

6.3 Monitoring of Student Laptops

The study informed school decision-making processes and led to the development of a two-pronged approach for managing student use of laptops by the School leadership team and the ICT committee, focusing on redefining expectations of appropriate ICT use. The key elements of this approach were the enhancement of parental controls and the introduction of a key-logging monitoring program: e-Safe. A framework of consequences was also introduced to support these initiatives. The enhancement of parental controls and the introduction of the key-logging monitoring program were introduced in the first five months of the laptop implementation. This structure helped the School to address many of the concerns expressed by students, parents and staff.

As discussed in Chapter One, the School conducted a thorough investigation of Apple and PC options in a range of school settings prior to the 1:1 implementation, ultimately deciding on the Apple platform. All students in Year Five (Cohort A) and Year Seven (Cohort B) were issued with an Apple MacBook. A key factor, which underpinned this decision, was that, contained within the operating system of the device, was a feature called ‘Parental Controls’. This parental control feature allowed each parent to set up a range of monitoring and time bound usage limiters as the administrator of the device, and was available at the point of laptop handover to the student. Two dedicated parental control information sessions were provided to help parents utilise the feature in their own homes. Time limits were the key feature used by parents as it allowed them to dictate when the MacBook could be used each evening. A default setting was set up for hours of operation between 8 a.m. and 8 p.m. Outside of these hours students were unable to log in to their machine without the parent overriding the parental control feature. Whilst parental controls could work well in the home environment with a parent as the administrator, they were essentially redundant in the networked environment of the School. A dedicated technical solution was sought for parental controls to work over the School network, and this was put in place as an enhancement five months after initial deployment. This solution involved enabling parents to be the primary administrator of the laptop, which was not the case initially. The School systematically monitored laptop use through LAN School, which is a software application enabling teachers and administrators to see all screens and observe what students are doing to limit off task behaviours such as gaming whilst in class and on campus.

Figure 6.22 shows the mean scores for Item Five (x): "Parental controls are beneficial for our son." Cohort A recorded an overall mean of 3.6 ± 0.2 whilst Cohort B recorded a mean of 3.5 ± 0.2, not significantly different.

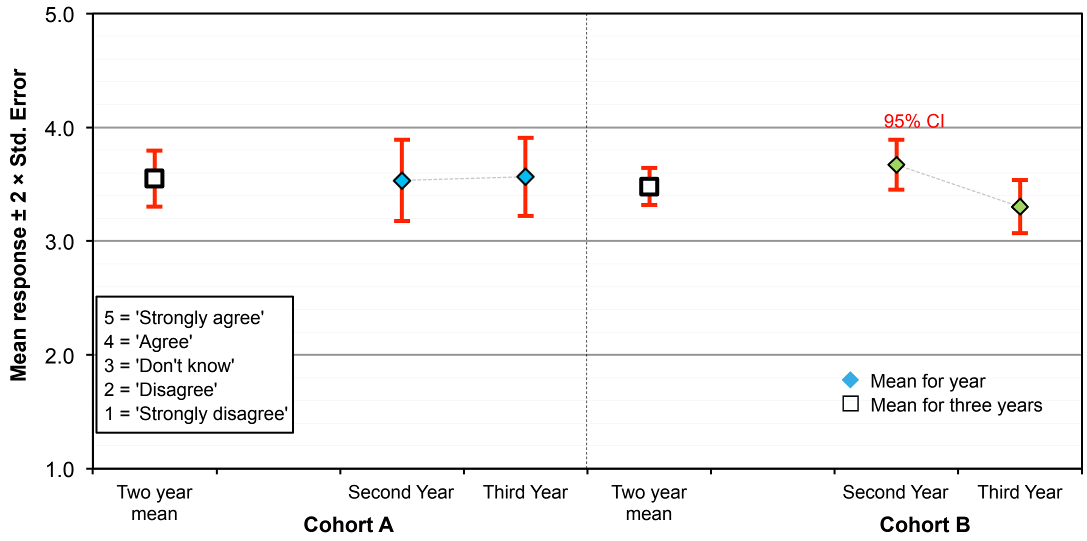


***Figure 6.22.* Mean responses by parents to Item Five (x): Parental controls are beneficial for our son.**

The use of parental controls was beneficial according to the parents of both cohorts. However in Cohort B this was less beneficial as indicated by the statistically significant decline in mean score of -0.4 between the second year (3.7 ± 0.2) and third year (3.3 ± 0.2).

Figure 6.23 shows the mean scores for Item Five (y): "Things have improved since the introduction of the parental controls and other monitoring processes adopted by the School." Cohort A recorded an overall mean score of 3.6 ± 0.2 whilst Cohort B recorded a mean of 3.3 ± 0.2, significantly lower (Ind. Samples t-test, $p < 0.05$).

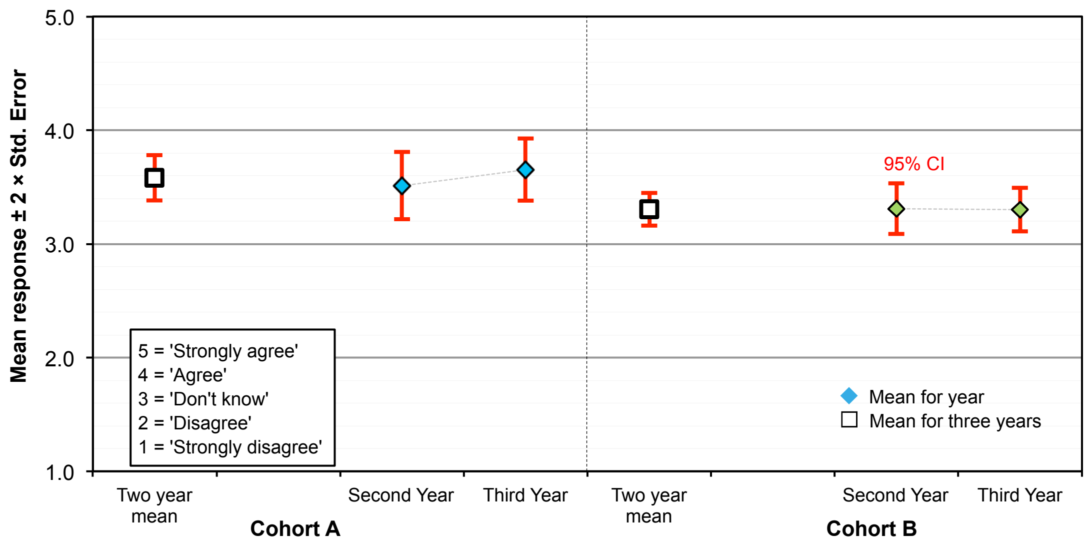


Figure 6.23. **Mean responses by students to Item Five (y): Things have improved since the introduction of the parental controls and other monitoring processes adopted by the School.**

The reference to 'things' in Item Five relates to how parents were dealing with the management of the laptop since the introduction of improved monitoring strategies. Cohort B remained constant with a mean score of 3.3 for the same period of time.

As the 1:1 implementation progressed, it became evident that students themselves acquired responsibility for the parental controls system, many becoming administrators of their own laptops. Parents who had not attended the initial session at handover and/or did not have adequate ICT knowledge and skills to configure parental controls on their son's laptop, possibly conceded to their son's apparent expertise. Many students were able to turn off the parental controls and use their laptop without monitoring conditions. With previous monitoring systems easily bypassed by students and the lack of detailed data about what was being accessed, this new direction was the catalyst for change in behaviour:

> There are some parents who are strict and they have sites blocked like Facebook and all this kind of stuff, but most of the boys, their parents happily give them their passwords. (B162011)

> No, not at all, my parents really don't have much of an idea about computers and found parental controls hard to use, so they turned it off. (B252012)

However, the most popular control used by parents was the setting of time limits to restrict laptop use during set times. Further to this, the introduction of e-Safe, the key-logging monitoring program at the School, also helped to send a clear message to all users about ethical use of ICT. Chapter Eight, Discussion, considers the impact of e-Safe, including a broader discussion about managing distraction.

6.4 Conclusion

This chapter has provided insight into parent perceptions of the 1:1 laptop program. Student participants had indicated that there had been a change in learning, for the positive and that they felt a greater sense of engagement and motivation towards learning. Teacher participants shared similar positive views; however, they maintained there was a need in maintaining a balance, and not over relying on the use of the laptops:

> I would hope that boys become engaged in their learning, within the classroom. I would hope that boys would be able to access a deeper level of information outside of the classroom, and I would hope that boys would be able to balance the use of technology and learning patterns throughout their schooling career. (CL472012)

Distractions associated with the use of laptops were evident and had an impact certainly in the initial years of the laptop program. These behaviours may be attributed to the excitement of a new initiative, and student participants testing the boundaries with the use of a laptop. Digital gaming in class was apparent in the first year of the study but decreased over time for both Cohorts. Gaming occurred when students were bored, or the teacher was not active in the lesson. However with the introduction of stringent monitoring approaches and clear guidelines student participants believed that their focus for learning developed over time and helped to negate the negative impact on learning. Parents seemed to concur with this view:

> I was not a great believer at the beginning, but I have slowly come around as long as one can control the game and movie side of use. (Parent Cohort, Third Year)

Parent perceptions of the laptop program indicated a concern for the impact of the laptops for their son's learning. Parents felt disconnected at times and were unable to comprehend fully laptop use or how they benefited learning. Parents softened in this view over time; however, they remained cautious about the impacts the laptops could have on assessment where it was required for their son to write pen in hand.

Parents indicated that motivation and engagement had increased since the introduction of the laptop program. The following account from a school leader indicates that the laptop had become more the ‘norm’ in terms of learning:

> After three years, I would probably say that there is now a recognition that this is a device which can be used for learning. I think initially there was the honeymoon period and the excitement period and the unknown period, both for students, staff and parents. I think there was this nervousness, a slight tension around the School with these boys carrying them round. I think also there was some excitement, and there was also some trepidation in using the device. So that’s now all petered out. I think it’s now, after three years, it’s an acceptable behaviour. I think students understand the framework which they’re working in, staff are better equipped in dealing with the situations, I think there’s a greater use of the portal, the drive of the portal, and just an acceptance of using technology in the classroom. (CL462012)

Finally, parents from Cohort A, who are part of the Junior School setting at the commencement of the implementation in the first year, were more confident about the 1:1 laptop program than parents from Cohort B. Responses to the student learning questions in Item Five (a) to (y) highlight these confidence levels. Of the 25 Likert-items, there were 21 statistically significant divergent mean scores over the two or three year period between Cohort A and Cohort B. The following chapter discusses these differences in further detail.

CHAPTER 7. Findings: Possible Impacts on Literacy and Numeracy

7.1 Introduction

Chapters Four, Five and Six focused on the views of teachers, students and parents regarding the 1:1 laptop program. This chapter discusses the student learning which could be attributed to the 1:1 implementation and the possible effects on learner engagement and motivation particularly in regards to literacy and numeracy outcomes. The chapter looks at the performance of Cohort A and B in the 2010 to 2012 National Assessment Program for Literacy and Numeracy (NAPLAN) compared to a previous cohort prior the 1:1 laptop program between 2008 to 2010.

The emphasis for Chapter Seven is to examine critically the data in relation to research question three, “What educational impact(s) if any, is there on student literacy and numeracy learning outcomes?” Bebell and O’Dwyer’s (2010) comprehensive literature review identified a lack of empirical evidence to prove laptops positively impact learning. This study attempts to add to the research literature by providing insights into how male students used laptops for learning, specifically in relation to literacy and numeracy outcomes. The study also considered related educational impacts such as learner engagement. Additionally, research question four, “What differences can be identified between junior and middle school implementations in regard to research questions 1, 2 and 3?” helps to focus the chapter on similarities and differences between the Junior and Middle School cohorts.

7.2 Changes to Learning

As a precursor to discussing student performance in relation to literacy and numeracy outcomes, this section presents the findings in relation to learner engagement and motivation and provides some broad insights into student and teacher perceptions of learning through the 1:1 laptop program.

This section presents the results of an analysis of the quantitative and qualitative data concerning teacher and student perceptions of the impact of laptop use on learning, engagement and motivation. Teacher and student participants from Cohort A and Cohort B were asked to respond to four items in the annual questionnaires to determine whether there were any changes in learning, engagement and motivation. A Likert-type scale of: 1 (*Low*) to 5 (*High*) was used to indicate the perceived level of change in learning and the level of engagement and motivation prior and since the introduction of the 1:1 laptop program. This Likert-type scale was applied to the questionnaire items for both student and teacher participants as shown in Table 7.1.

Table 7.1
Change in Learning, Engagement and Motivation Annual Questionnaire Items

Participant	Questionnaire item (Student and teacher questionnaire)
Student	(10) Have there been any changes in your learning because of your use of the laptop?
Teacher	(21) Have there been any changes in your students' learning since the introduction of the laptop program?
Student	(11) Do you feel more or less engaged towards learning since you received your laptop?
Teacher	(22) Do you feel students are more or less engaged towards learning since the introduction of the laptop program?
Student	(12) What was your motivation, prior to the introduction, of the laptop program?
Teacher	(23) What was the student motivation, prior to the introduction, of the laptop program?
Student	(13) What is your level of motivation since the introduction of the laptop program?
Teacher	(24) What was the level of student motivation since the introduction of the laptop program?

Figure 7.1 shows the comparative mean scores between student and teacher participants in response to Items 10 (student) and 21 (teacher): "Have there been any changes in your learning because of your use of the laptop?" at the end of the first year, second year and third year of the study.

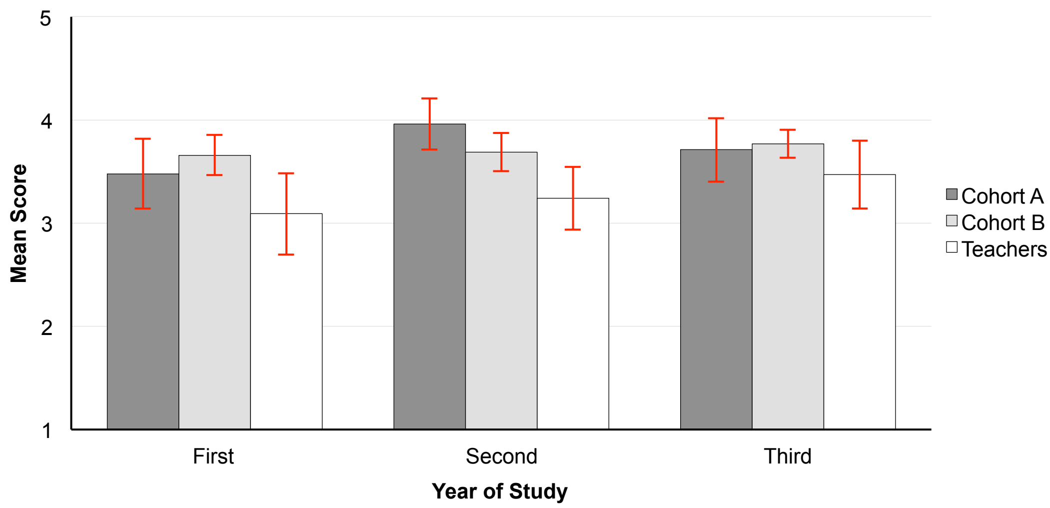


Figure 7.1. **Student and teacher participants' mean scores for change in learning since the introduction of the 1:1 laptop program.**

Thirty student participants interviewed annually were asked (Question 20): "Have there been any changes in your learning since you have had a laptop?" Student participants responded by giving examples of these changes in learning which mainly emanated from the structure of lessons.

Using NVivo, 10 sub-nodes within a main node of "Changes in learning" resulted from student responses during annual interviews between the first year and third year of the study. Data was then aggregated over three years, from the three sets of interviews. Figure 7.2 displays a radar graph of the 10 coded areas both Cohort A and B recognised as changes in learning from the interview data.

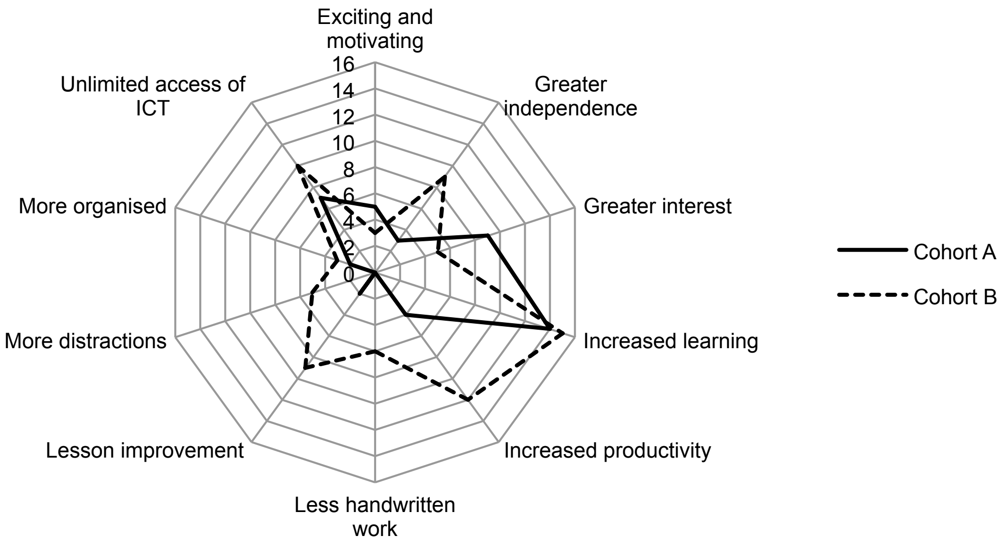


Figure 7.2. **Student perceptions about changes in learning since the introduction of the 1:1 laptop program for Cohort A and Cohort B.**

Increased learning for both cohorts was the highest recorded change in learning within the node of "Changes in learning." Seven student participants from Cohort A and nine from Cohort B indicated the reasons why they considered learning had increased was due to: having unlimited access to ICT, which increased productivity, greater interest in learning, and lessons were more interesting, exciting and motivating:

> I feel more, like, I can answer more questions with using the laptops because now I'm understanding more of the concept. (A092010)
>
> I think the teachers find it easy to get their point across. They use YouTube and that kind of thing, showing us how to actually do it, like, putting it into practice, and it makes it easier to understand. (B212011)
>
> Probably I know a lot more about each subject, like, it was probably limited to what you could find out with a subject before laptops. So when you had to do an assignment on something they might not be ... the task might not be that hard and because they know you can't find the information as much. But now you can find a lot more information and so they make the task harder, and kids know more, kids are learning more and putting more into their work, so they're getting better marks. (B122012)

The teachers were also asked (Question 14): "Have there been any changes in your students' learning since the introduction of the laptop program?" Figure 7.3 shows eight types of coded responses.

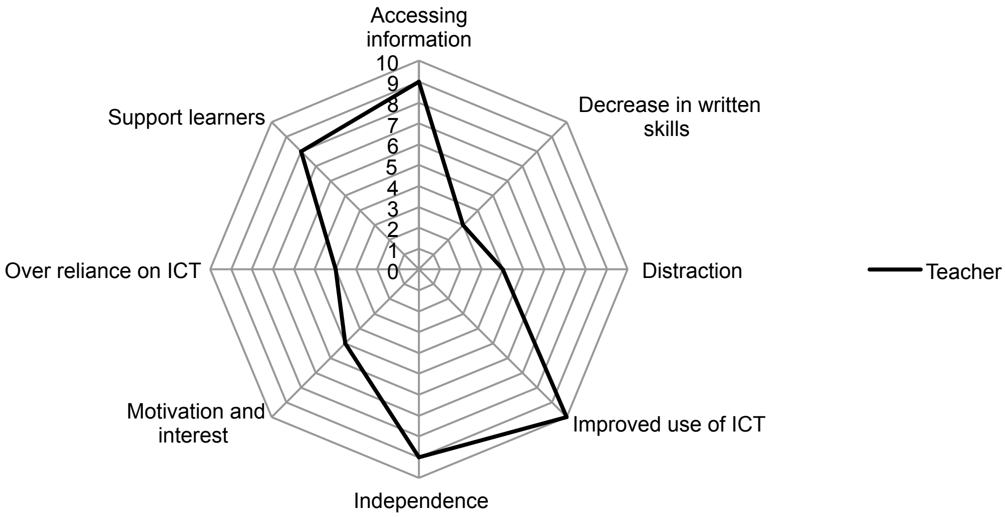


Figure 7.3. **Teacher perceptions about changes in learning since the introduction of the 1:1 laptop program.**

When teachers were asked to elaborate on changes in learning the excerpts from teacher participants 35 and 60 address the areas of supporting learners and access to information:

> I think there are a lot of kids that one particular learning style does not fit. I think with the laptops they are able to learn at their own rate, they are able to learn and be specific to who they are, rather than to be specific to 31 kids. They can go and learn at their own rate, so I think that's absolutely vital since the laptop program's been implemented, and I can see that is a huge plus for introducing the program. (C352010)

> I certainly believe now that most definitely there has been a change in terms of their access to information and whereas prior to that the teacher and the textbook needed to be the gurus in terms of knowing everything about everything. Now they have it at their fingertips, and I think that has to be an improvement, because there is so much information out there. Access to information and I think now, what happens now is, you know, you look at our role and I think that does subtly start to change because now it becomes much more a question of okay, how do we facilitate them to be able to discern between what's truth and what's fiction, what's relevant, what's not relevant. (C602011)

Nine teacher participants believed that the use of ICT had improved with the use of a laptop, in particular the technical expertise with ICT. There was also a view held by teachers the students were becoming increasingly responsible with their use of laptops:

> Well, I will give you an example of the sort of website situation. You could only build a very basic, say if they were a year nine level, you know, if you went back five years ago. It was just tables, text, background, very basic because we just didn't have that, you know, I guess information or ability to direct that but as we have got skilled ourselves, boys are increasingly skilled. If they are right into it, they will explore that JavaScript or Java query, and now you start getting boys that are year nine level doing stuff that year 12s would do. (C502012)

Four teacher participants shared concerns of the overreliance of using laptops. Teacher Participant 60 expressed a view of the 'dangers' with students using laptops for learning:

> I think there are dangers in terms of becoming, where the kids are totally preoccupied with the use of computer. Because I think, education's a lot more complex. There are a lot of other things that make it what it should be as far as, you know, there needs to be interaction and discussion and debate and all those sorts of things, but the computer obviously fulfills a good role there. (C602011)

There was a relatively low number of teachers who held a view that the 1:1 laptop program had a negative impact on writing with only three coded responses as seen in Figure 7.3. The following excerpts provide an example of this perception:

> I am concerned with the amount our Year Seven's are writing, their ability to write is an issue. And obviously the amount of times that they are putting pen to paper has been reduced with the onset and reliance of laptops. In saying that though, their ability to generate ideas is very good. (C522010)

> I think negatively and the one that still worries me and causes me sleepless nights is the pen-in-hand writing. You only have to watch our examinations and see the examination halls that one, boys struggle with the physical demands of writing for sustained time; I find they do not produce anywhere near enough as what other colleges are. And two, it is probably a picky one is the legibility of the writing is becoming an issue. We have a lot more students, I find, that it is actually difficult to decipher what they are writing because they are not doing handwriting and concentrating on making it neat. So they are two of the negatives, I think. But, I think that is probably a long-term thing. (C552012)

Only four teacher participants reported having difficulty in determining if there were any changes in student learning. These teachers were not conclusive in attributing laptops for a change in learning:

> It would be hard to say, I mean, over the three years I have not noticed anything massively different but it would be tricky to say, it is quite a short time. (C652012)

Question 18 of the annual interviews asked teacher participants: "Do you have any concerns about the laptop program?" Teacher participants responded with five types of concerns as shown in Figure 7.4.

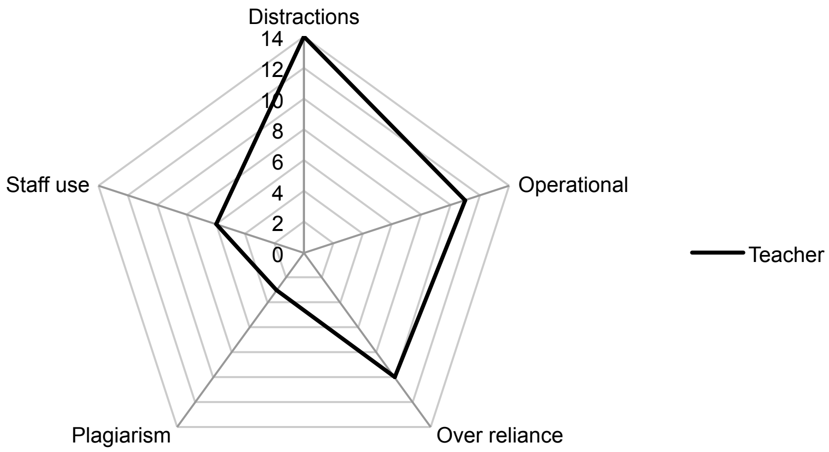


Figure 7.4. **Teacher participants' coded responses for concerns about the laptop program between the first year and third year of the study.**

The response registering the greatest number of comments was distractions. Fourteen teachers reported concerns about how the laptops were a distraction or at times had impacted on student focus.

> Yes, it is a distraction, and we are looking at a generation now. I sound like an old man, get off the lawn sort of here, it just worries me, but you go out now and you see people around you endlessly that cannot put their mobiles away, that they are continually touching them, and I see this with the boys in the class. It worries me when we take it off them, they are almost, and some of them seem to be suffering from some sort of withdrawal symptoms. (C552012)

> I still have a bit of an issue with the kids in terms of their focus and the personality types who are easily distracted and what to do about those kids. (C602012)

A range of operational issues detracted from the smooth implementation of the 1:1 program. Eleven teachers shared concerns about issues of power supply, bandwidth monitoring, mobility, and the use of loan laptops. The following excerpts provide an example of these concerns:

> I have a number of concerns: firstly power is a huge concern. We need to rewire the room so that you get dangling cords coming down, or you have got the little fold up things at the bottom so that kids can plug in. The power issue is huge. At the end of the day, it's not unusual to have four, five, six kids, and the thing is, leave your power cord at home, you know, they do not, thank God, because I can plug them into the side, and they can keep working. So that is a huge issue that needs to be addressed. Issues of bandwidth need to be addressed, I think particularly when it comes to things like assessment. If you are going to have six simultaneous classes doing assessment

> from the same website, issues of bandwidth need to be addressed. Monitoring, I think, needs to be continued. Sanctions need to be public, and they need to be strong, so that students in Year Nine, for instance, and I guess predominantly we're talking about Year Nine who get caught going to dodgy sites. The consequences of that need to be known and they need to be very strong. (C542012)

> My only issue is a few things. It's heavy and the boys carry it around, it's cumbersome. I would like to see in future the iPad for the kids, something which is lighter and is more portable, I know the laptops are supposed to be portable, but for little kids it's heavy. And that's what I think is one detraction from it. (C322010)

> Certainly one of the things we've raised in our learning area is having better wireless access outside of the classroom. (C392010)

> Only probably issues is when boys hand in a laptop and get rented laptops or loan laptops that don't have the software, they may not have their work backed up, they don't know the procedure for doing that sort of stuff. (C502012)

There were some discrepancies between data collected from questionnaires and data collected at interviews. For example, three teachers shared their concerns about plagiarism. This was not mentioned at interview, which may indicate plagiarism is not a key issue as seen in Figure 7.4. Similarly in the questionnaire, five teachers expressed their concern about other staff being reluctant when using ICT. This is at odds with the teachers interviewed who were predominately positive about using ICT:

> I think we are probably heading in the right direction. Concerns, yes, probably just ... my concerns are more about the acceptance by staff. I think you find that there's going to be naturally some resistance to it. That's not to say that people are not going to use it but are they going to fully embrace it and take it to where it could be? (C602011)

Teachers reported a clear set of concerns providing valuable insights into future foci for implementing change. Again, the theme of distraction was a prominent and common view shared by the teachers as previously discussed in section 4.8.2 of Chapter Four.

7.2.1 Engagement levels with laptops

Item 11 of the student questionnaire required the students to indicate their level of engagement towards learning since receiving their laptop. Similarly, Item 22 of the teacher questionnaire required teachers to indicate student engagement towards learning since the introduction of the laptop program using a Likert-type scale of 1

(*Low*) to 5 (*High*). Figure 7.5 shows the mean scores for the study over three years for both students and teachers.

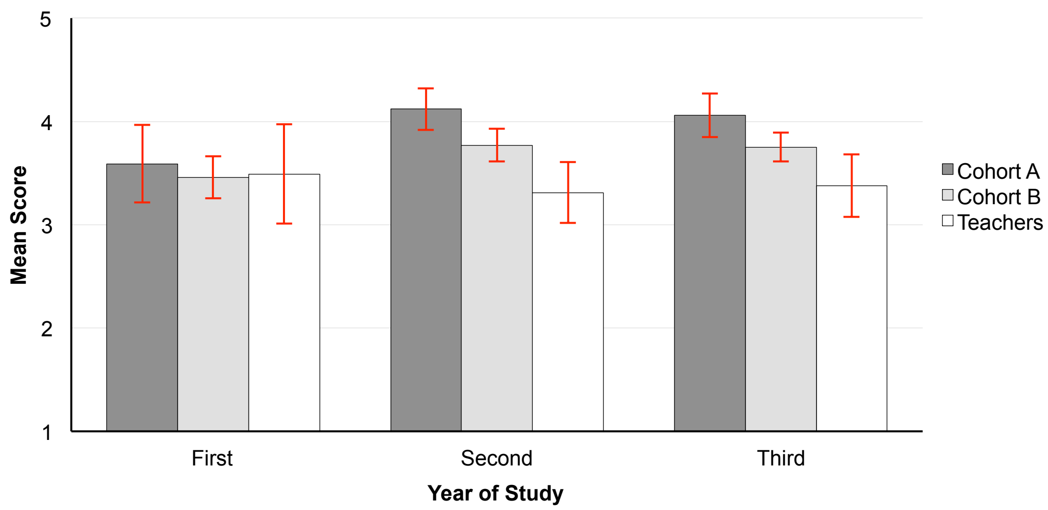


***Figure 7.5.* Student and teacher participants' three year mean scores for perceptions of student engagement levels since the introduction of the 1:1 laptop program.**

The mean score for Cohort A increased (0.5) from 3.6 ± 0.4 to 4.1 ± 0.2 and Cohort B increased (0.3) from 3.5 ± 0.2 to 3.8 ± 0.1. Both of these instances were statistically significant (One-Way ANOVA, $p < 0.05$). Students from both cohorts who were interviewed annually and asked Question 21: "Do you feel more or less engaged towards learning since you received your laptop?"

> The laptop gives learning a more fun experience, and you get to learn a lot more on a laptop because you concentrate on it. (A032011)

> I think I feel more engaged purely for the fact that I'm finding out the information by myself as opposed to the teacher kind of reading it from a book and taking notes from it. So yeah, I feel more engaged. (B162012)

Teachers did not record the same level of enthusiasm for student engagement as student participants. Teachers recorded the lowest mean score in the third year of the three groups. Teachers, interviewed annually, were asked (Question 15): "Do you feel students are more or less engaged towards learning since the introduction of the laptop program?" Responses were coded into three types of categories: less engaged, no change and more engaged. Out of 29 teachers, two teachers believed students were less engaged, and four believed there was no change in student engagement:

> They are more engaged, and they are less engaged at the same time, it is paradoxical really. They are more engaged because they have a greater array of programs to access which kids without laptops would not even know exist. I think they can present their information in a much more efficient and aesthetically pleasing way. So I think they are more engaged in that sense. They are less engaged due to the distractions. (C572012)

However, the overwhelming sentiment expressed by teachers at the interviews was that the laptops helped improve student engagement. A total of 23 teachers believed laptops improved the rate of engagement towards learning since the implementation of the 1:1 laptop program. This view remained consistent throughout the study as shown in the following annual excerpts:

> It is certainly more engaging. Because they are involved in it more. It's their currency, it's what they use outside of school, so it only makes sense to use it inside of school. (C412010)

> I believe there is value. The engagement factor, especially with boys, is a significant improvement from what I've seen in previous years with teaching without a laptop. (C682011)

> The students are more engaged. Because ICT is so prevalent in everything they do, they now can use it as part of their learning. They are naturally involved in ICT at all levels, whether it's phone, at home with computer games, things like that. Now they get to use it in a different part of their life, and especially those boys who probably have more ability they can use their intuition a bit more. If they have got particular skills in programming they can use that more; if they like the arts they can still be arty and creative, it's just on a different platform. So I think in terms of those different style of learning, it can get each boy. (C622012)

Again, data from the annual questionnaires compared to the annual interviews appeared to be contrasting for the teachers. The mean scores from the questionnaire revealed a perception of lower level of engagement for learning compared to that of the students. Teachers may be seen to be more guarded or perhaps even cynical on the issue and, this might have accounted for lower means. However, the annual teacher interviews provided a different view of laptops in terms of student engagement, as clearly there was a difference between the quantitative and qualitative findings. This difference may have been because teachers articulated a more positive perception when probed at interview. Teachers believed there was a greater impact on student engagement since the introduction of the 1:1 laptop program. This stated belief was similar to the view of the students, who were also of the view laptops helped improve engagement in learning.

7.2.2 Motivation towards learning since the implementation

Learner engagement is defined as continual interaction and practice, where teaching and feedback are important in ensuring students develop good habits and improve their learning. The ability to improve can lead to motivation to participate and further engage students in learning (Irvin, Meltzer, & Dukes, 2007). Therefore, motivation is defined as the level of student effort utilised to improve or achieve a set goal (Seifert, 2004).

Item 13 and Item 24 of the student and teacher questionnaires respectively asked participants to gauge the level of motivation towards learning since the introduction of the 1:1 laptop program using a Likert-type scale of 1 (*Low*) to 5 (*High*). Figure 7.6 shows the annual mean scores.

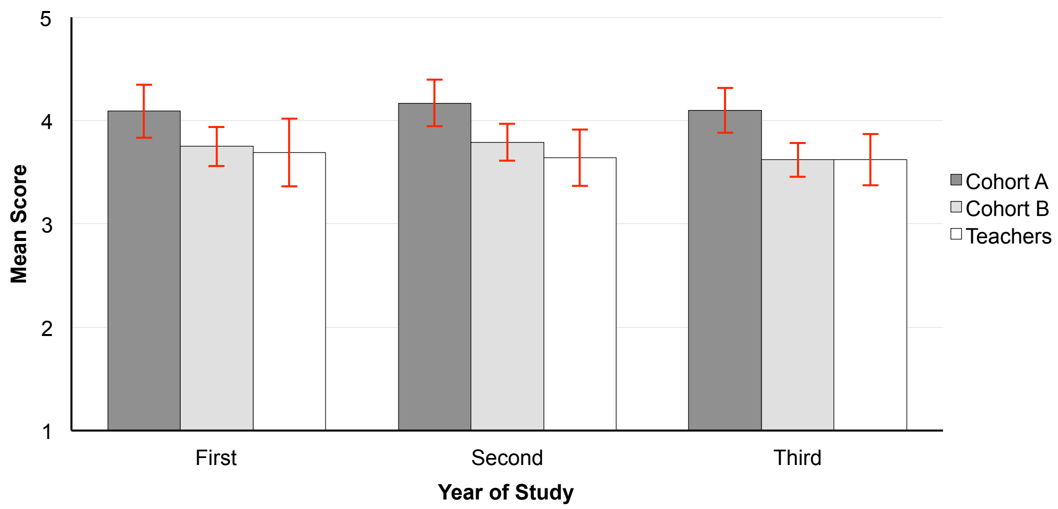


***Figure 7.6.* Student and teacher mean score responses to perceptions of student motivation since the implementation of the 1:1 laptop program.**

The following excerpt from an interview with Student Participant 02 (a student from the high band of achievement) from Cohort A is an example of the observed change in motivation in response to the two questions from the annual interview: (22) "What was your motivation, prior to the introduction, of the laptop program?" and (23) "What is your level of motivation since the introduction of the laptop program?"

[Interviewer] On a scale of one to five, one being low and five being high, what was your level of motivation before the introduction of the laptop program?

[Participant] Probably about a four.

[Interviewer] Explain?

[Participant] Because I was interested in the work that we were doing but not one hundred per cent, like, desperate to get going and start on whatever work we'd been given.

[Interviewer] On a scale of one to five, 1 being low and 5 being high, what is your current level of motivation since the introduction of the laptop program?

[Participant] Five.

[Interviewer] Why five?

[Participant] Because now I am very excited to get going because the assignments are more interesting, creating movies with special effects and using spreadsheet applications to create budgets. (A022012)

This narrative was typical of many Cohort A students who reported an increase in their level of motivation. As can be seen, the 1:1 laptop program was felt to play a role. The following excerpt from Student Participant 14 (a student from a high band of achievement) from Cohort B also demonstrates an example of an increase in motivation:

[Interviewer] On a scale of 1 to 5, 1 being low and 5 being high, what was your level of motivation before the introduction of the laptop program?

[Participant] Probably about a three.

[Interviewer] Why's that?

[Participant] I was still interested in learning, but it just wasn't that fun and as interesting as it was with the laptops.

[Interviewer] On a scale of 1 to 5, 1 being low and 5 being high, what is your current level of motivation since the introduction of the laptop program?

[Participant] About four.

[Interviewer] Why is that?

[Participant] Well, with the laptops you can bring back your work with you, bring back everything you've done, you've got all your documents in one place. Like, I remember I always used to forget books when I didn't have the laptop but now I just bring back my laptop and I've got everything with me.

The following excerpt is from an interview with Teacher Participant 34 in an interview in the third year of the study:

> [Interviewer] On a scale of 1 to 5, 1 being low and 5 being high, what were the levels of motivation prior to the laptop program to where we are right now? How would you summarise that?
>
> [Participant] In 2010, I thought it was high but when I reflect on it now I think ... as far as motivation I would like to have thought my kids were always motivated when I was teaching them before the laptops, but I think for the low ability students, the motivation has improved. I think for the high ability students it was there anyway, so that's probably quite stable for them. But low abilities have definitely improved because they can get automatic feedback, you can differentiate the tasks more so than we could before. I think because there's that visual aspect of the laptop, that information technology thing, they are more engaged. They're certainly a lot more organised because everything is all there, they do not have to carry a hundred different books and pencils, everything can be put in the laptop case. But I think that's definitely improved. (C322012)

The qualitative data suggests that the motivation levels for lower achieving students had increased because laptops may have opened up opportunities for them to activate a different learning style. For higher achieving students, laptops may have slightly increased motivation because they may have activated their self-directed capacities.

7.2.3 Student participants focus on learning

Annually, the 30 student participants from Cohort A and Cohort B were asked (Question 13): "Do you think you are more focused as a student with your own laptop?" This question was specifically aimed at determining if the laptops had an impact on student focus on learning. This focus is interpreted as student concentration levels, priority of learning and ability to reflect on the learning process. A total of 131 references for the topic of focus on learning were coded from the four interview stages (first year inception, first year, second year and third year). Students consistently responded with three types of responses, categorised into the following: distraction, no improvement and improvement. Figure 7.7 and Figure 7.8 show the number of coded responses for both Cohort A and Cohort B.

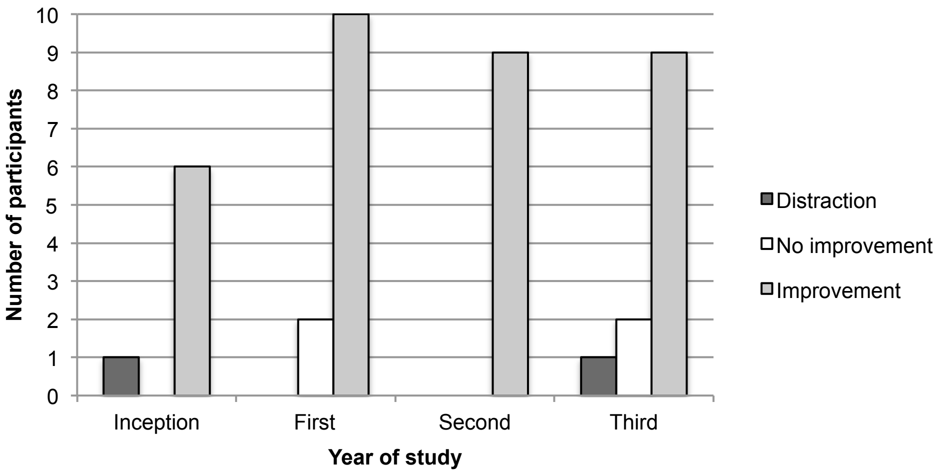


Figure 7.7. **Cohort A (N = 10) student responses for focus on learning with the use of a laptop.**

Students from Cohort A generally believed laptops had helped to improve their focus towards learning. The belief was consistently reported at each of the four intervals of the study as shown in Figure 7.7. There were four references of no improvement and two instances of distractions being said to have an impact on the focus for learning. However, it was evident from the number of responses that Cohort A was supportive of the opportunities to learn in different ways and the access to information that 1:1 laptops provided.

> I think I am more focused because I can do things that I wouldn't be able to do on, like, paper, I would be able to do it on a laptop and enjoy what I'm doing. (A082011)

> I think I am more focused because it's just I've got all the information right in front of me; I don't need to be asking a lot more questions, I know what I have to do and it's all there on the laptop. (A092012)

Cohort B also reported improvements in terms of being more focused due to the use of laptops; however, this fluctuated as seen in Figure 7.8. By the third year, 17 student participants believed they were more focused on learning since the introduction of the 1:1 laptop program.

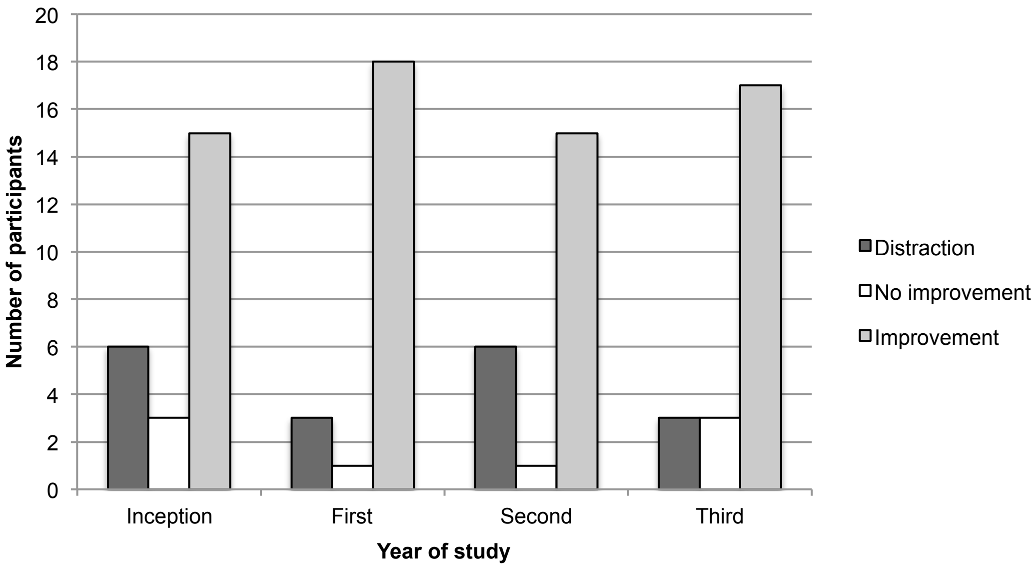


Figure 7.8. **Cohort B (N = 20) student responses for focus on learning with the use of a laptop.**

The self-directed capacities of 1:1 laptops appear to have been attractive to students from Cohort B. The following excerpts show examples of this:

> I think I was a little bit more focussed because when I didn't have my own laptop it was easy to talk to friends or just turn around and someone's sitting next to you but whereas when there's a laptop you're sort of engrossed in what you're doing. So, yeah, you're really focussing on what you're doing. (B162010)

> I feel more focussed with the laptop. With the laptop, in school I can ... I know what to do and I complete it. I don't really want to do anything else; I just want to get it done. (B132012)

In summary, both Cohort A and Cohort B reported learning with a laptop had increased their focus on their learning. It is significant that in the third year 26, of the 30 interviewed students still responded that with the use of a laptop they were more focused towards learning.

7.3 Literacy and Numeracy: NAPLAN

As discussed in Chapter Two, NAPLAN is a test of literacy and numeracy skills over time through school curriculum. NAPLAN is made up of tests in the four areas (as referred to in this study) of reading, writing, language conventions (spelling, grammar and punctuation) and numeracy. Annually, NAPLAN testing occurs in Years Three, Five, Seven and Nine across all schools in Australia (ACARA, 2014).

7.3.1 Overview of NAPLAN for Analysis

Both cohorts completed NAPLAN in the first year (2010) and third year (2012), which provided an opportunity to consider results in the four areas over this time. In the first year of the research, NAPLAN was undertaken three months after the deployment, making it more or less a pre-test in terms of this research. Lei and Zhao (2008) report that other research studies have sought to gauge the impact of using ICT pre and post testing in one or more subject areas (Gulek & Demirtas, 2005; Rockman et al., 2000; Shapley et al., 2009; Silvernail & Gritter, 2005).

Analysing the NAPLAN results for both cohorts for three years pre and post the 1:1 laptop implementation helped in gauging the impact of the 1:1 laptop program in the learning areas of literacy and numeracy. NAPLAN data also provided an opportunity for the study to compare the two cohorts to previous years where students did not have laptops. There was no control group due to the scale of the 1:1 implementation at the School. As a method of comparison, previous year levels (Years Five, Seven and Nine) were used to compare pre-laptop NAPLAN results to NAPLAN results where student used laptops for learning. The Year Five to Seven and Year Seven to Nine students from the School, in 2008 to 2010 are used as a comparative measure. As discussed earlier this was the only other cohort used for comparison as NAPLAN was introduced in 2008 (first year of the study commenced in 2010). The area of Writing had not been included in the three year analysis due to the changes in the Writing section of NAPLAN from 2011. A move from narrative writing to persuasive writing was approved by Australian State Ministers in 2010 following extensive piloting (Turvey, 2012).

When describing NAPLAN results, there are five scales, one for each of the learning areas of Reading, Writing, Numeracy and two for Language Conventions (Grammar and Punctuation, and Spelling). The five scales span all year levels from Year Three to Year Nine and describe the development of student achievement according to ten-bands on the scale. The scales are designed so that any given score by any student in Australia, can be interpreted the same way over time and represents the same level of achievement. For example, a score of 700 in Numeracy will have the same meaning in 2012 as in 2010, enabling improvements to be gauged over time. Each learning area is divided into 10 bands on the scale to cover the full range of student achievement in the test. The bands are used for reporting student performance at each year level. The Year Three report shows bands one to six, Year Five bands three to eight, Year Seven bands four to nine, and the Year Nine shows bands five to ten (ACARA, 2014) (further information about NAPLAN is available at http://nap.edu.au).

Sections 7.3.3 and 7.3.4 provide a summary of NAPLAN results for the period 2008 to 2012, for grade levels Year Five, Year Seven and Year Nine, for: (a) students at the School; and (b) males nationally. Section 7.3.5 presents several sets of NAPLAN score data, for years 2008, 2010 and 2012, for Year Five. Section 7.3.6 provides the same treatment for Year Seven NAPLAN score data, for years 2008, 2010 and 2012. Similarly Section 7.3.7 provides the same treatment for Year Nine NAPLAN score data, for years 2008, 2010 and 2012.

Ideally when comparing schools it is useful to select 'like schools' based on the Index of Community Socio-Educational Advantage (ICSEA). However, as there were a limited number of male-only schools that were similar in ICSEA to the School, the School was compared with males nationally. Data for the students at the School is presented systematically alongside corresponding data for males nationally. For every mean NAPLAN test score, a corresponding 'Uncertainty of the Mean' is provided (in terms of a 95% Confidence Interval (CI)). This enables the researcher to use a statistical test: 'One-Way ANOVA (Analysis of Variance) for Summary Data' to determine when a difference between a mean for the students at the School and the corresponding mean for males nationally is statistically significant at either the $p < 0.01$ or the $p < 0.05$ level.

Section 7.3.8 turns the focus away from NAPLAN test scores and towards NAPLAN test cohort gain data. The following cohort gain scenarios are considered, for both the students at the School and males nationally:

- Year Five to Year Seven, 2008 to 2010;
- Year Five to Year Seven, 2010 to 2012 (Cohort A);

- Year Seven to Year Nine, 2008 to 2010; and
- Year Seven to Year Nine, 2010 to 2012 (Cohort B).

Differences between the students at the School and males nationally are again tested for statistical significance using the One-Way ANOVA process. Finally, Sections 7.3.9 to 7.3.11 move away from comparisons of the students at the School with males nationally, and seeks to make comparisons of cohort gain between different groups of males at the School. The following comparisons are made:

- Year Five to Year Seven, 2008 to 2010 with Year Five to Year Seven, 2010 to 2012; and
- Year Seven to Year Nine, 2008 to 2010 with Year Seven to Year Nine, 2010 to 2012.

Again, a One-Way ANOVA is used for Summary Data test. Further to this, rather than undertaking the cohort gain comparisons resolved according to the four individual NAPLAN areas (excluding Persuasive writing), an approach of pooling the NAPLAN test scores from the four individual areas into a 'Four area Combined' score is undertaken. This enables the research to make the cohort gain comparisons for the cohort as a whole, rather than only for the individual constituent areas (see Figure 7.9).

Figure 7.9. **NAPLAN analysis overview for the research.**

7.3.2 Summary of NAPLAN data 2008 to 2012: Comparing Cohort A and males nationally in Year Five

Figure 7.10 provides a summary of NAPLAN test results for Year Five students for the years 2008 to 2012; for the School and all males nationally. Each bar in the figure represents the mean score for a particular year for the NAPLAN area indicated. Represented in green is the School, and in blue is the national male mean. Cohort A is shown as Year Five students in 2010 (first year of the study).

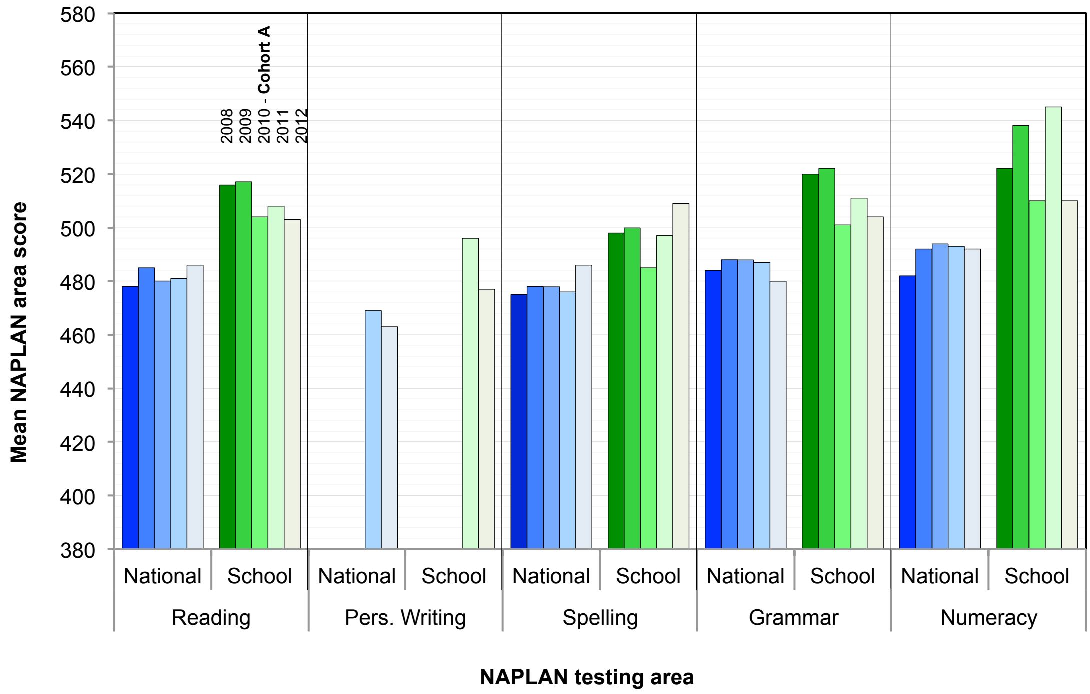


Figure 7.10. **Year Five NAPLAN test results 2008 to 2012: The School and males nationally.**

The key features to note from Figure 7.10 are now stated. Over the five-year period, 2008 to 2012 (inclusive), the mean score achieved by the School was roughly +20 marks higher than that achieved by Year Five males nationally for Reading, Spelling, and Grammar and Punctuation. For Numeracy the margin was larger, at about +40 marks in 2008, 2009 and 2011. For Persuasive Writing, a roughly +20 mark gap was observed in 2011 and 2012.

In 2010 (Cohort A) the Year Five Cohort scores for Spelling, Grammar and Punctuation, and Numeracy, were approximately 10 marks above the mean achieved nationally by males. The Year Five School results are consistent across the period of 2008 to 2012, with 2010 being the only year that recorded lower scores compared to the other years. The extent to which the difference between the School Year Five cohorts and the Year Five national averages are statistically significant will be discussed in section 7.3.5.

7.3.3 Summary of NAPLAN 2008 to 2012: Comparing Cohort A and Cohort B and males nationally in Year Seven

Figure 7.11 displays the School mean score compared to the national mean score for males in Year Seven. Cohort B are shown as Year Seven students in 2010 (first year of study) and Cohort A are seen as Year Seven students in 2012 (third year of study).

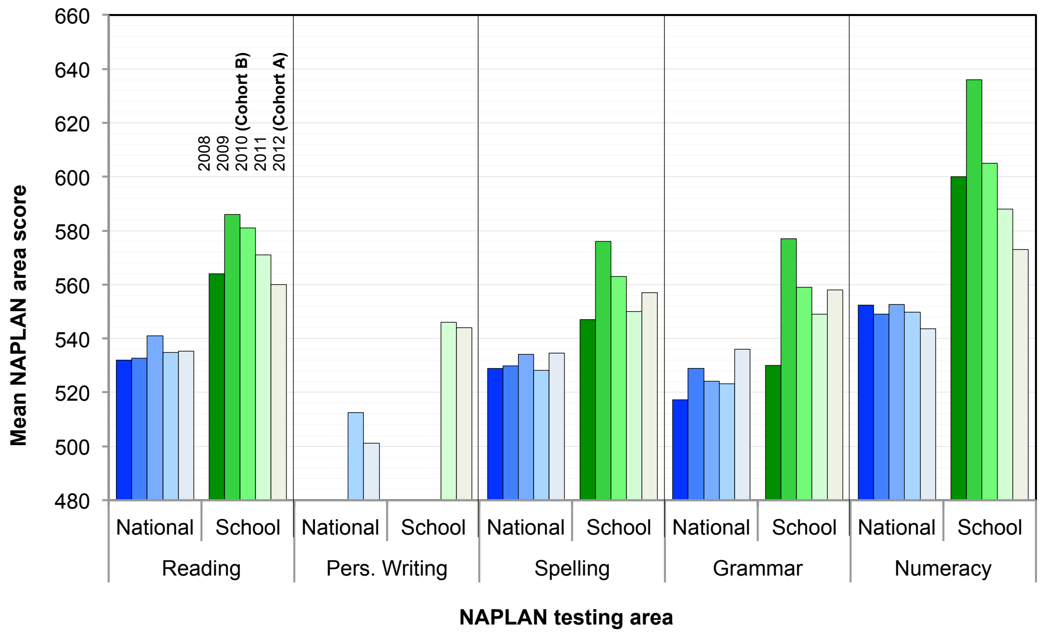


Figure 7.11. **Year Seven NAPLAN test results 2008 to 2012: The School and males nationally.**

The key features to note from Figure 7.11 are now stated. Over the five-year period, 2008 to 2012 (inclusive), the mean score achieved by the school was roughly +30 marks higher than that achieved by Year Seven males nationally, (in the four areas excluding Persuasive Writing). For Persuasive Writing, a roughly +30 mark gap was observed in 2011 and 2012. The above margins in relative terms represents a difference of about +5.5%, across the board (i.e. for all areas).

The 2009 Year Seven cohort at the School scored particularly well in the four areas. In this year the margin between the School and Year Seven males Nationally was on average about +9.5% in relative terms. Since the outstanding results of 2009, the School's results have tended in subsequent years to return to a position closer to, but still well above, the Year Seven male national results. The extent to which the differences between the School Year Seven cohorts and the Year Seven national average are statistically significant will be discussed in section 7.3.6.

7.3.4 Summary of NAPLAN data 2008 to 2012: Comparing Cohort B and males nationally in Year Nine

Figure 7.12 displays the School mean score compared to the national mean score for males in Year Nine. Cohort B is shown as Year Nine students in 2012 (third year of the study).

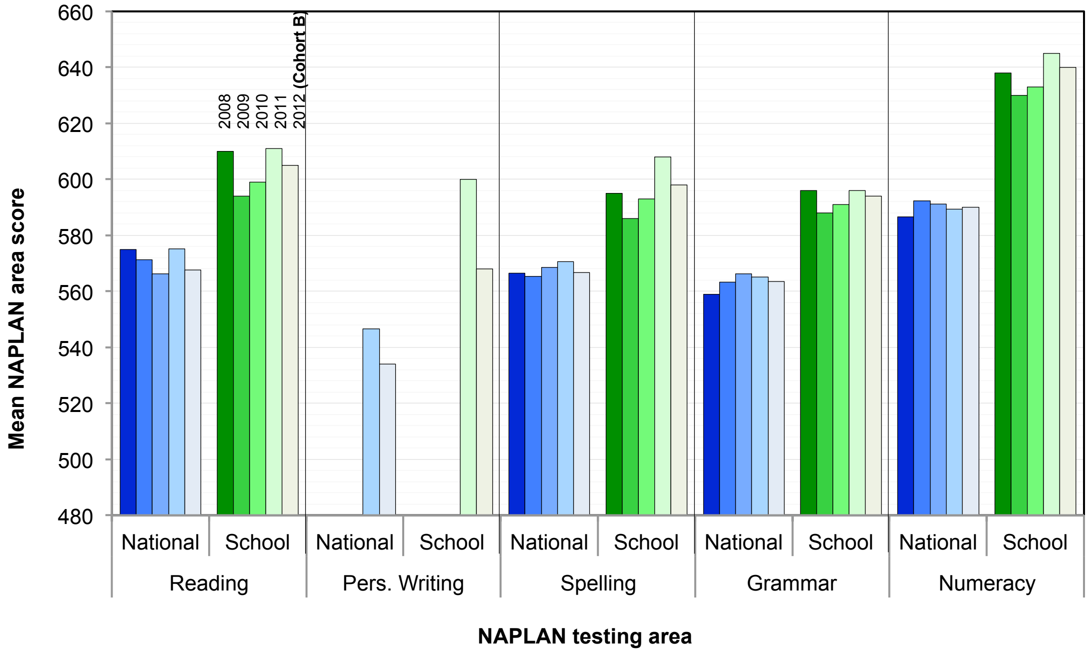


Figure 7.12. **Year Nine NAPLAN test results 2008 to 2012: The School and males nationally.**

The key features to note from Figure 7.12 are now stated. Over the five-year period, 2008 to 2012 (inclusive), the mean score achieved by the School was roughly +30 marks higher than that produced by males nationally in Reading, Spelling and Grammar and Punctuation. For Numeracy, the margin was even larger, at about +50 marks. For Persuasive Writing, a +40 mark gap is seen in 2011 and 2012.

The above margins of +30, +40 and +50 marks in relative terms represent differences of about +5%, 7.5% and 8.5%, respectively. The Year Nine School results are more or less consistent across the period 2008 to 2012, with no one year being outstandingly strong or outstandingly weak. The extent to which the differences between the School Year Nine cohorts and the Year Nine national average are statistically significant is now discussed in section 7.3.7.

7.3.5 NAPLAN data for Year Five, 2008, 2010 and 2012: Comparing the School and males nationally

Table 7.2 details Year Five NAPLAN test results for 2008, 2010 and 2012 (Cohort A – first year); for students at the School and males nationally. Data includes N (number of students tested), the mean test result, the standard deviation of the test results, and the 95% Confidence Interval (CI) of the mean result.

Table 7.2
Year Five Mean NAPLAN Test Results for 2008, 2010 and 2012 (School and National)

Grade Level	Year	Area	School				National (males)			
			N	Mean	Std. Dev.	95% C.I.	N	Mean	Std. Dev.	95% C.I.
Year 5	2008	Reading	*53*	516.2	77.4	21.3	262,872	478.4	77.4	2.0
		Spelling	*53*	497.7	75.0	20.6	263,126	474.5	75.0	2.0
		Grammar & Punctuation	*53*	519.8	81.3	22.3	263,126	484.4	81.3	2.0
		Numeracy	*53*	521.8	70.5	19.4	262,268	481.6	70.5	2.0
	2010 Cohort A	Reading	52	503.8	77.0	21.4	266,050	480.5	77.0	2.0
		Spelling	54	485.3	73.3	19.9	266,505	477.8	73.3	2.0
		Grammar & Punctuation	55	501.1	80.2	21.6	266,505	488.1	80.2	2.0
		Numeracy	54	510.4	72.1	19.6	265,100	494.4	72.1	2.0
	2012	Reading	73	502.7	79.2	18.5	245,203	486.1	79.2	2.0
		Persuasive writing	73	467.5	69.6	16.3	245,096	462.6	69.6	2.0
		Spelling	73	508.7	76.7	18.0	245,660	485.6	76.7	2.0
		Grammar & Punctuation	73	503.9	84.3	19.7	245,660	480.3	84.3	2.0
		Numeracy	73	510.2	73.1	17.1	244,364	492.1	73.1	2.0

Note. Std. Dev.=Standard Deviation. 95% CI = $\pm 2 \times \text{Std.Dev.}/(N)^{1/2}$

Figure 7.13 (see below) plots the 2008 NAPLAN Year Five results as seen in Table 7.2. The Schools results are in green and national males results are in blue. The red uncertainty bars represent the 95% CI. Note that in the national results, due to N being large (>250,000) the 95% CI is very small, no thicker than the line at the top of the blue columns.

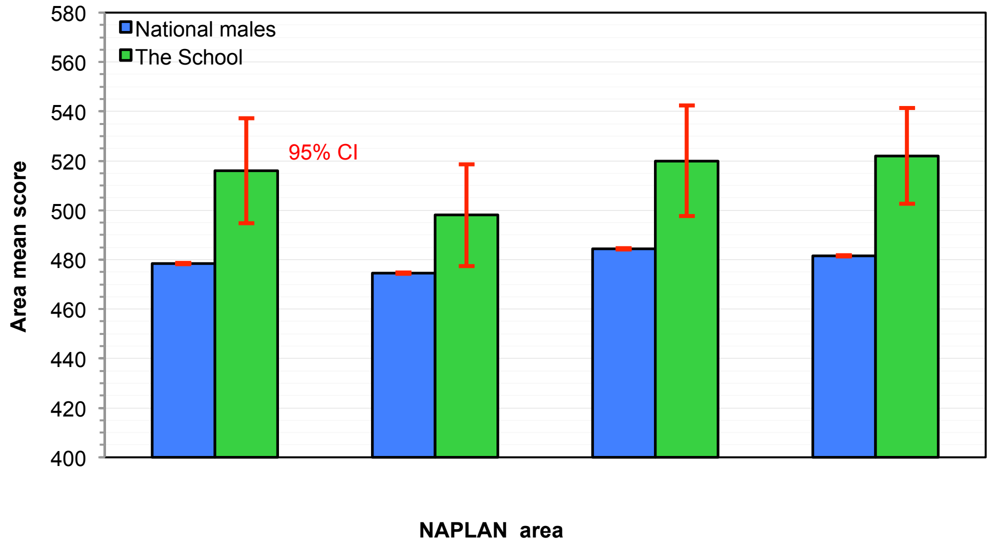


Figure 7.13. **NAPLAN mean test results Year Five 2008 (School and national).**

In Reading, Grammar and Punctuation, and Numeracy, the difference between the Year Five School result and males nationally is significant at the p < 0.01 level. For Spelling, the difference is significant at the p < 0.05 level. See Table 7.3 for these significance results tabulated.

Table 7.3
One-Way ANOVA for Summary Data Test Results for Year Five 2008, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School – National]	95% C.I.	F	Sig.
Year 5	2008	Reading	53	516.2	77.4	262,872	478.4	77.4	37.6	15.0	12.1	0.000**
		Spelling	53	497.7	75.0	263,126	474.5	75.0	23.5	14.6	5.0	0.025*
		Grammar & Punctuation	53	519.8	81.3	263,126	484.4	81.3	35.6	15.8	9.8	0.002**
		Numeracy	53	521.8	70.5	262,268	481.6	70.5	40.4	13.7	16.8	0.000**

Note. A 'One-Way ANOVA (Analysis of Variance) for summary data' process was used to test whether the observed differences between the Year Five school students and national males NAPLAN mean scores were statistically significant. The input to the ANOVA process was N, mean, and Std. Dev. (as tabulated in columns 4-6 and columns 7-9). Column 10, Δ(The School – national) shows the difference between the School and national mean scores, and column 11 shows the 95% CI of that difference. Columns 12 and 13, respectively, list the F-statistic of the ANOVA test, and its Significance. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.14 plots the 2010 NAPLAN Year Five results as shown in Table 7.2. In Reading, the difference between the School and the males nationally is significant at the p < 0.05 level.

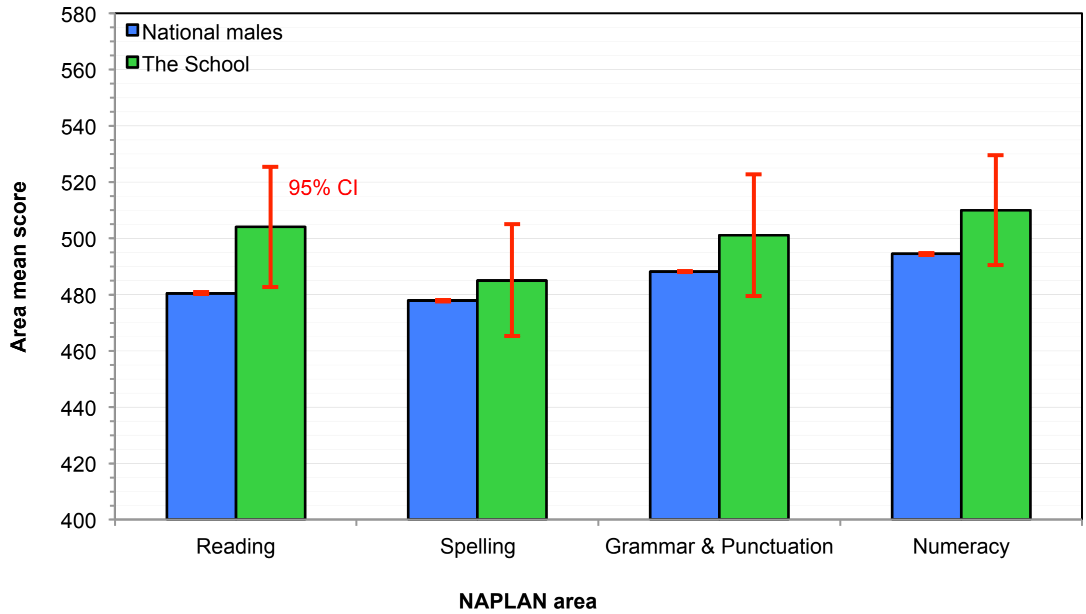


Figure 7.14. **NAPLAN mean test results Year Five (Cohort A) 2010 (School and national).**

For the other areas, the differences were not significant (at the $p < 0.05$ level). See Table 7.4 for these significance results tabulated.

Table 7.4

One-Way ANOVA for Summary Data Test Results for Year Five 2010 (Cohort A) NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 5	2010	Reading	52	503.8	77.0	266,050	480.5	77.0	23.5	15.1	4.84	0.028*
		Spelling	54	485.3	73.3	266,505	477.8	73.3	7.2	14.1	0.52	0.471
		Grammar & Punctuation	55	501.1	80.2	266,505	488.1	80.2	12.9	15.3	1.42	0.233
		Numeracy	54	510.4	72.1	265,100	494.4	72.1	15.6	13.9	2.53	0.112

Note. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

Figure 7.15 (see below) plots the 2012 NAPLAN Year Five results as shown in Table 7.2. For the three areas of Spelling, Grammar and Punctuation, and Numeracy, the difference between the School and the males nationally is significant at the $p < 0.05$ level.

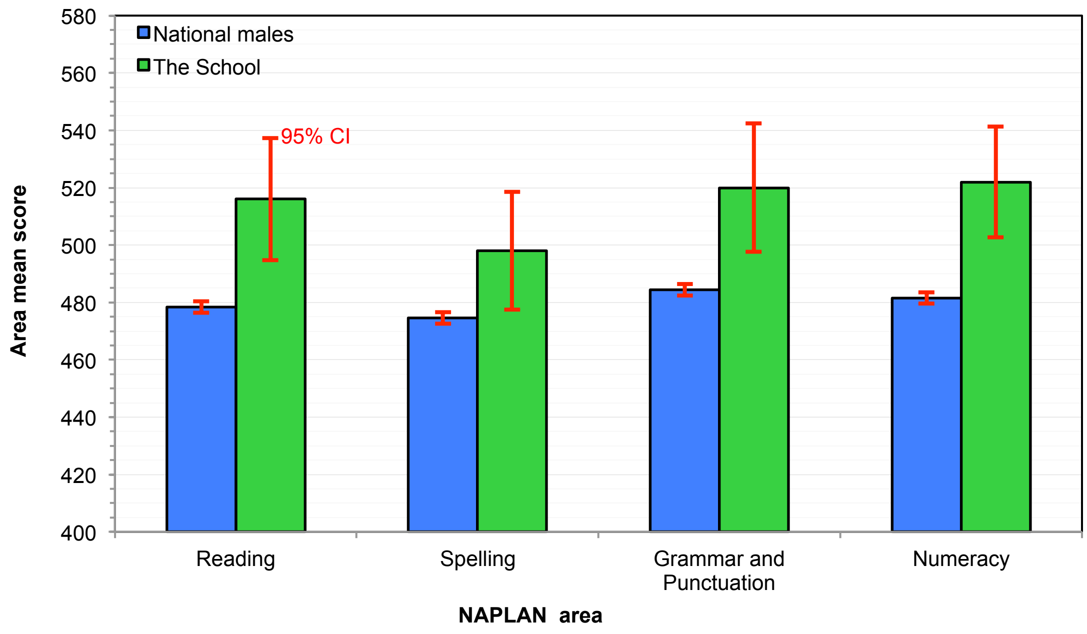


Figure 7.15. **NAPLAN mean test results Year Five 2012 (School and national).**

For the two remaining areas of Reading and Persuasive writing, the differences in mean scores were not significant. See Table 7.5 for these significance results tabulated.

Table 7.5
One-Way ANOVA for Summary Data Test Results for Year Five 2012 NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 5	2012	Reading	73	502.7	79.2	245,203	486.1	79.2	16.6	13.2	3.07	0.080
		Persuasive writing	73	476.5	69.5	245,096	462.6	69.6	13.9	11.6	2.79	0.095
		Spelling	73	508.7	76.7	245,660	485.6	76.7	23.1	12.8	6.33	0.012*
		Grammar & Punctuation	73	503.9	84.3	245,660	480.3	84.3	23.6	14.0	5.47	0.019*
		Numeracy	73	510.2	73.1	244,363	492.1	73.1	18.1	12.2	4.28	0.039*

Note. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

In 2008, the Year Five students from the School scored roughly +35 marks higher than Year Five males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +7.5%. In 2008, the margins of the Year Five students from the School results over the Year Five males nationally were significant at the $p < 0.01$ level for the three areas Reading, Grammar and Punctuation, and Numeracy. For Spelling, the margin was significant only at the $p < 0.05$ level.

In 2010, the Year Five students from the School scored roughly +15 marks higher than Year Five males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +3.0%. In 2010, the margin of the Year Five students from the School results over the Year Five males nationally was statistically significant at the $p < 0.05$ level for Reading.

In 2012, the Year Five students from the school scored roughly between +23 marks higher than Year Five males nationally (in three areas excluding Reading and Persuasive writing). In relative terms, this was equivalent to a margin of about +4.0%. In 2012, the margin of the Year Five students from the School results over the Year Five males nationally was statistically significant at the $p < 0.05$ level for Spelling, Grammar and Punctuation, and Numeracy.

7.3.6 NAPLAN data for Year Seven, 2008, 2010 and 2012: Comparing the school and males nationally

Table 7.6 details Year Seven NAPLAN test results for the School and males nationally for 2008, 2010 (Cohort B – first year of study) and 2012 (Cohort A – third year of study). Data includes N (number of students tested), the mean test result, the standard deviation of the test results, and the 95% CI of the mean result.

Table 7.6
Detailed Year Seven NAPLAN Test Results for 2008, 2010 and 2012

Grade Level	Year	Area	The School				National (males)			
			N	M	Std. Dev.	95% C.I.	Nat'l N	M	Std. Dev.	95% C.I.
Year 7	2008	Reading	134	563.9	69.9	*12.1*	265,627	531.9	69.9	2.0
		Spelling	134	547.0	74.1	*12.8*	266,083	528.8	74.1	2.0
		Grammar & Punctuation	134	529.6	73.8	*12.8*	266,083	517.3	73.8	2.0
		Numeracy	134	600.0	75.8	*13.1*	265,275	552.3	75.8	2.0
	2010 Cohort B	Reading	135	580.7	69.7	12.0	264,682	540.9	69.7	2.0
		Spelling	134	563.5	73.6	12.7	265,414	534.1	73.6	2.0
		Grammar & Punctuation	134	558.6	74.9	12.9	265,414	524.1	74.9	2.0
		Numeracy	135	604.7	75.0	12.9	263,808	552.7	75.0	2.0
	2012 Cohort A	Reading	138	560.0	69.4	11.8	267,646	535.3	69.4	2.0
		Persuasive Writing	136	543.7	74.9	12.8	267,981	501.1	74.9	2.0
		Spelling	140	557.2	73.3	12.4	268,521	534.5	73.3	2.0
		Grammar & Punctuation	140	557.6	68.7	11.6	268,521	536.0	68.7	2.0
		Numeracy	137	572.6	76.9	13.1	266,669	543.7	76.9	2.0

Note. Nat'l N = National number. 95% CI = $\pm 2 \times$ Std.Dev./$(N)^{½}$

Figure 7.16 presents the plot of 2008 NAPLAN Year Seven results as shown in Table 7.6.

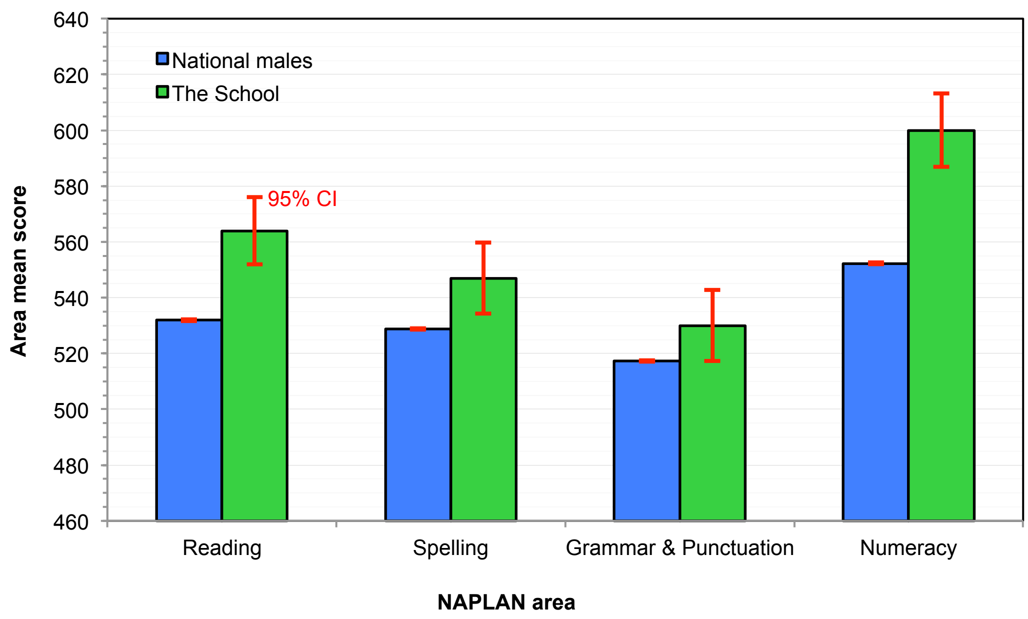


Figure 7.16. **NAPLAN mean test results Year Seven 2008 (School and national).**

In Reading, Spelling and Numeracy the difference between the School and males nationally is significant at the $p < 0.01$ level. See Table 7.7 for these significance results tabulated.

Table 7.7

One-way ANOVA for Summary Data Test Results for Year Seven 2008 NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 7	2008	Reading	134	563.9	69.9	265,627	531.9	69.9	32.1	8.7	26.1	0.000**
		Spelling	134	547.0	74.1	266,083	528.8	74.1	18.2	9.2	7.46	0.006**
		Grammar & Punctuation	134	529.6	73.8	266,083	517.3	73.8	12.7	9.1	3.66	0.056
		Numeracy	134	600.0	75.8	265,275	552.3	75.8	47.7	9.4	49.0	0.000**

Note. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

Figure 7.17 displays the plot of 2010 NAPAN Year Seven (Cohort B) results as shown in Table 7.6.

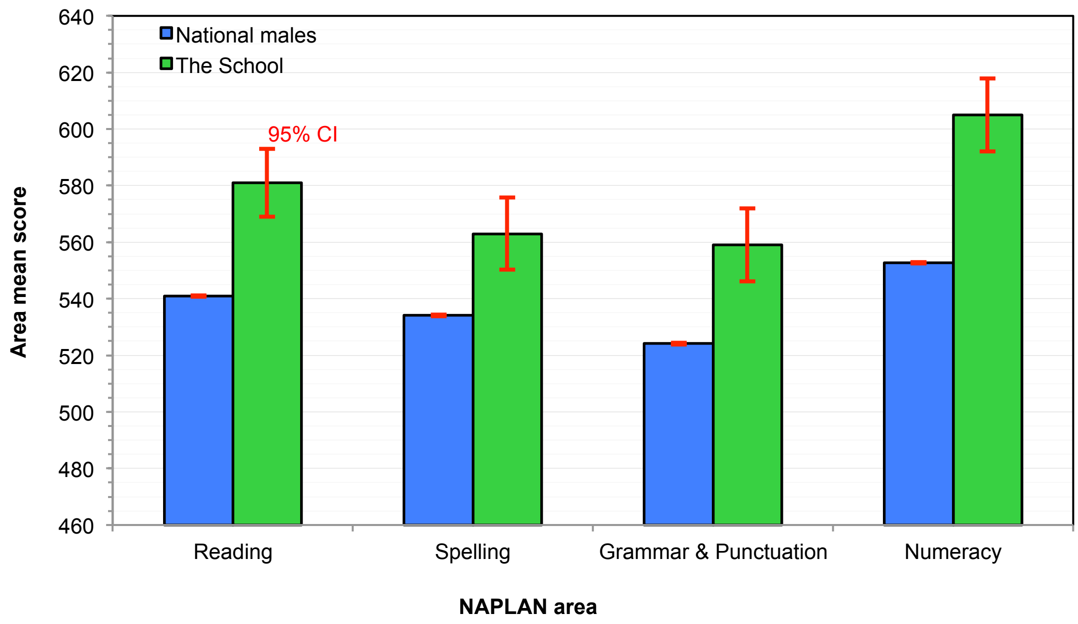


***Figure 7.17.* NAPLAN mean test results Year Seven (Cohort B) 2010 (School and national).**

In all four areas the differences between the Year Seven (Cohort B) students at the School and the males nationally were significant at the p < 0.01 level. See Table 7.8 for these significance results tabulated.

Table 7.8
One-way ANOVA for Summary Data Test Results for Year Seven (Cohort B) 2010 NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 7	2010	Reading	135	580.7	69.7	264,682	540.9	69.7	40.1	8.6	41.2	0.000**
		Spelling	134	563.5	73.6	265,414	534.1	73.6	28.9	9.1	19.1	0.000**
		Grammar & Punctuation	134	558.6	74.9	265,414	524.1	74.9	34.9	9.3	26.8	0.000**
		Numeracy	135	604.7	75.0	263,808	552.7	75.0	52.3	9.2	60.5	0.000**

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.18 displays the plot of 2012 NAPAN Year Seven (Cohort A) results as shown in Table 7.6.

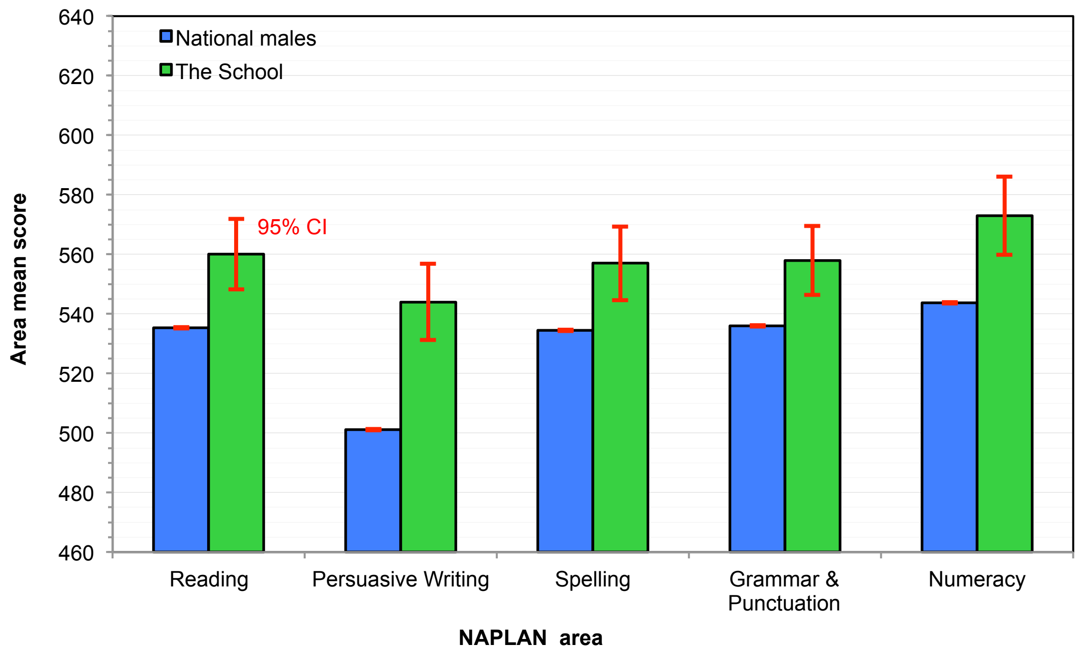


***Figure 7.18.* NAPLAN mean test results Year Seven (Cohort A) 2012 (School and national).**

In all five areas, (now including Persuasive Writing), the differences between the Year Seven students (Cohort A) from the School and the males nationally results were significant at the $p < 0.01$ level. See Table 7.9, for these significance results tabulated.

Table 7.9

One-way ANOVA for Summary Data Test Results for Year Seven (Cohort A) 2012 NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 7	2012	Reading	138	560.0	69.4	267,646	535.3	69.4	24.7	8.5	16.1	0.000**
		Persuasive Writing	136	543.7	74.9	267,981	501.1	74.9	42.9	9.2	41.1	0.000**
		Spelling	140	557.2	73.3	268,521	534.5	73.3	22.5	8.9	12.1	0.000**
		Grammar & Punctuation	140	557.6	68.7	268,521	536.0	68.7	22.0	8.3	13.2	0.000**
		Numeracy	137	572.6	76.9	266,669	543.7	76.9	29.3	9.4	18.3	0.000**

Note. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

In 2008, the margin of the School's Year Seven results over the males national Year Seven results were significant at the $p < 0.01$ level for the three areas Reading, Spelling and Numeracy. For Grammar and Punctuation, the margin was significant only at the $p < 0.05$ level.

In 2010, the Year Seven (Cohort B) students at the School scored roughly +40 marks (ranging from +29 to +52) higher than Year Seven males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +7.0%. In 2010, the margin of the School's Year Seven (Cohort B) results over the males national Year Seven results were significant at the $p < 0.01$ level for all four NAPLAN areas (excluding Persuasive Writing).

In 2012, the Year Seven (Cohort A) students at the School scored roughly +25 marks (ranging from +22 to +29) higher than Year Seven males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +4.5%. In 2012, the margin of the School's Year Seven (Cohort A) results over Year Seven males national results were significant at the $p < 0.01$ level for all four NAPLAN areas (excluding Persuasive Writing). Additionally in 2012, for the recently introduced (in 2011) area of Persuasive Writing, the Year Seven (Cohort A) students at the School scored +43 marks higher than Year Seven males nationally; equivalent to a relative margin of +8.5%. This margin, like those for the other four areas, was significant at the $p < 0.01$ level.

7.3.7 NAPLAN data for Year Nine 2008, 2010 and 2012 (Cohort B): Comparing the School and males nationally

Table 7.10 details Year Nine NAPLAN test results for 2008, 2010 and 2012 (Cohort B); for the School and males nationally.

Table 7.10
Detailed Year Nine NAPLAN Test Results for 2008, 2010 and 2012 (Cohort B)

Grade Level	Year	Area	The School				National (males)			
			N	Mean	Std. Dev.	95% C.I.	N	Mean	Std. Dev.	95% C.I.
Year 9	2008	Reading	180	610.5	67.0	10.0	262,549	575.0	67.0	2.0
		Spelling	180	595.3	72.9	10.9	263,297	566.5	72.9	2.0
		Grammar & Punctuation	180	596.2	70.4	10.5	263,297	558.9	70.4	2.0
		Numeracy	180	638.2	70.2	10.5	262,122	586.5	70.2	2.0
	2010	Reading	173	599.1	67.1	10.2	260,046	566.2	67.1	2.0
		Spelling	173	592.7	75.6	11.5	261,408	568.5	75.6	2.0
		Grammar & Punctuation	173	591.4	71.0	10.8	261,408	566.3	71.0	2.0
		Numeracy	173	633.0	72.7	11.1	258,827	591.1	72.7	2.0
	2012 Cohort B	Reading	176	605.4	67.0	10.1	257,003	567.7	67.0	2.0
		Persuasive writing	173	568.1	86.2	13.1	257,864	533.9	86.2	2.0
		Spelling	176	598.0	73.3	11.1	258,623	566.6	73.3	2.0
		Grammar & Punctuation	176	594.1	70.1	10.6	258,623	563.4	70.1	2.0
		Numeracy	176	640.2	74.7	11.3	255,403	590.0	74.7	2.0

Figure 7.19 presents the plot of 2008 NAPLAN Year Nine results as seen in Table 7.10. The area of writing is not included as persuasive writing was only included in second year of the study.

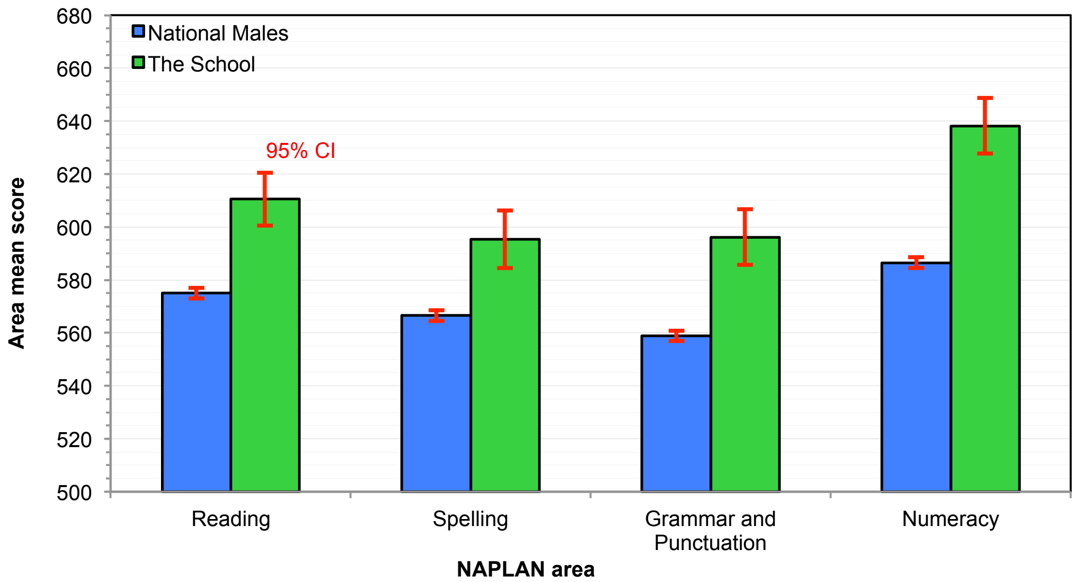


Figure 7.19. **NAPLAN mean test results Year Nine 2008 (School and national).**

In all four areas, the differences between the Year Nine students at the School and males nationally were significant at the p < 0.01 level. See Table 7.11 for these significance results tabulated.

Table 7.11
One-Way ANOVA for Summary Data Test Results for Year Nine 2008 NAPLAN Data, Comparing the School and Males Nationally.

Grade Level	Year	Area	The School			National (Males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 9	2008	Reading	180	610.5	67.0	262,549	575.0	67.0	35.5	7.2	45.4	0.000**
		Spelling	180	595.3	72.9	263,297	566.5	72.9	28.8	7.8	25.3	0.000**
		Grammar & Punctuation	180	596.2	70.4	263,297	558.9	70.4	37.3	7.6	45.4	0.000**
		Numeracy	180	638.2	70.2	262,122	586.5	70.2	51.7	7.5	87.8	0.000**

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.20 presents the plot of 2010 NAPLAN Year Nine results as seen in Table 7.10. The area of writing is not included in 2010 as persuasive writing was only included in the second year of the study.

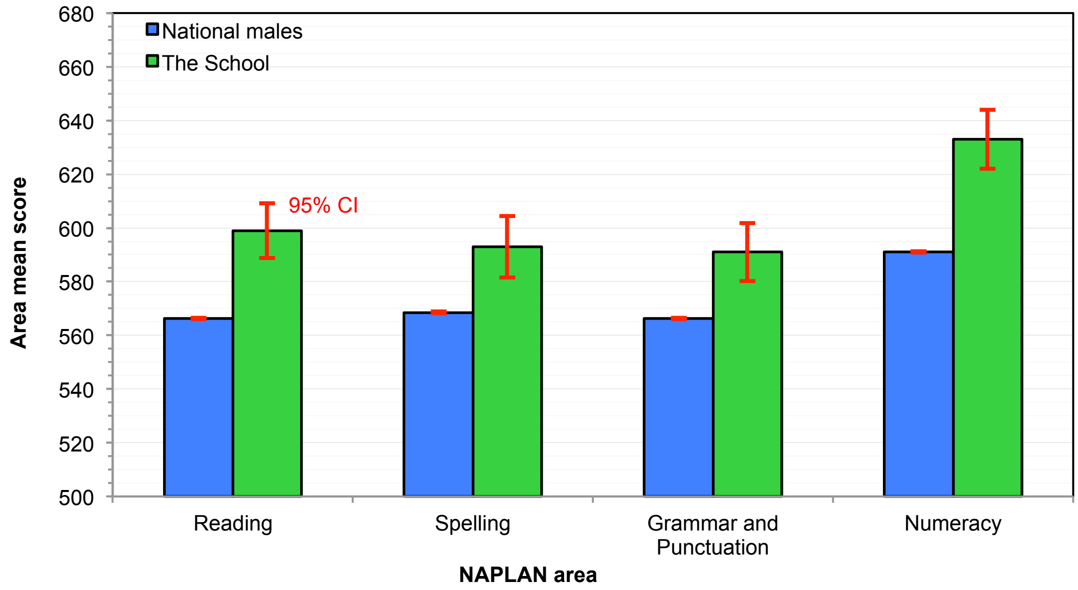


Figure 7.20. **NAPLAN mean test results Year Nine 2010 (School and national).**

In all four areas, the difference between the Year Nine students at the School and males nationally results were significant at the p < 0.01 level. See Table 7.12 for these significance results tabulated.

Table 7.12
One-Way ANOVA for Summary Data Test Results for Year Nine 2010 NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (Males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 9	2010	Reading	173	599.1	67.1	260,046	566.2	67.1	32.8	7.4	37.3	0.000**
		Spelling	173	592.7	75.6	261,408	568.5	75.6	24.5	8.3	16.4	0.000**
		Grammar & Punctuation	173	591.4	71.0	261,408	566.3	71.0	24.7	7.8	18.9	0.000**
		Numeracy	173	633.0	72.7	258,827	591.1	72.7	41.9	7.9	51.9	0.000**

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.21 displays the plot of 2012 NAPAN Year Nine (Cohort B) results as seen in Table 7.10.

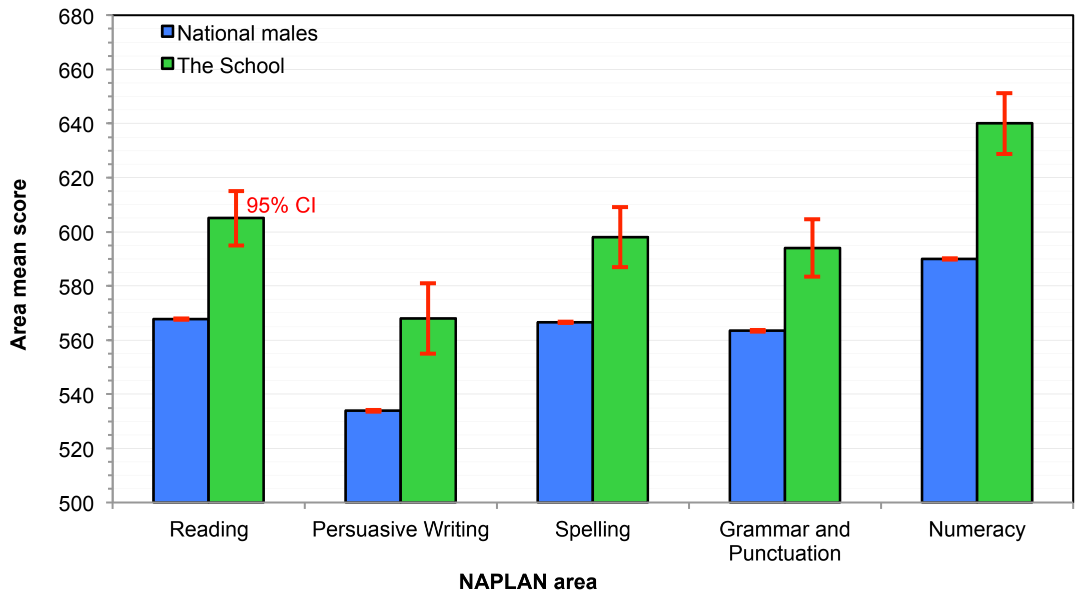


Figure 7.21. **NAPLAN mean test results Year Nine (Cohort B) 2012 (School and national).**

In all four areas, the difference between the Year Nine students at the School and the males nationally result is significant at the p < 0.01 level. See Table 7.13, below for these significance results tabulated.

Table 7.13
One-Way ANOVA for Summary Data Test Results for Year Nine 2012 NAPLAN Data, Comparing the School and Males Nationally

Grade Level	Year	Area	The School			National (Males)			ANOVA Results			
			N	Mean	Std. Dev.	N	Mean	Std. Dev.	Δ [School - National]	95% C.I.	F	Sig.
Year 9	2012	Reading	176	605.4	67.0	257,003	567.7	67.0	37.3	7.3	49.1	0.000**
		Persuasive Writing	173	568.1	86.2	257,864	533.9	86.2	34.1	9.4	24.8	0.000**
		Spelling	176	598.0	73.3	258,623	566.6	73.3	31.4	7.9	29.1	0.000**
		Grammar & Punctuation	176	594.1	70.1	258,623	563.4	70.1	30.6	7.6	30.2	0.000**
		Numeracy	176	640.2	74.7	255,403	590.0	74.7	50.0	8.1	71.0	0.000**

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

In 2008, the School's Year Nine students scored roughly +39 marks (ranging from +29 to +52) higher than Year Nine males nationally (in all four areas excluding persuasive writing). In relative terms, this was equivalent to a margin of about +6.5%. In 2008, the margin of the School's Year Nine results over the Year Nine males national results were significant at the p < 0.01 level for all four areas (excluding Persuasive Writing).

In 2010, the School's Year Nine students scored roughly +31 marks higher (ranging from +25 to +42 marks) than Year Nine males nationally (in the four subjects excluding Persuasive Writing). In relative terms this was equivalent to a margin of about +5.5%. In 2010, the margin of the School's Year Nine results over the Year Nine males national results were significant at the $p < 0.01$ level for all four areas (excluding Persuasive Writing).

In 2012, the School's Year Nine students (Cohort B) scored roughly +37 marks (ranging from +31 to +50) higher than Year Nine males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +6.5%. In 2012, the margin of the School's Year Nine results over the Year Nine national males results were significant at the $p < 0.01$ level for all four NAPLAN areas (excluding Persuasive Writing). Additionally in 2012, for the recently introduced (in 2011) area, Persuasive Writing, the School's Year Nine students scored +34 marks higher than Year Nine males nationally; equivalent to a relative margin of about +6.5%. This margin, like those for the other four areas, was significant at the $p < 0.01$ level. In both 2010 and 2012, the Numeracy results for Year Nine at the School were particularly outstanding in comparison to males nationally. In relative terms, this was equivalent to +7.0% and 8.5%, respectively in 2010 and 2012.

7.3.8 NAPLAN cohort gain data: Comparing the School and males nationally

The research is interested at looking at changes to literacy and numeracy over time, and therefore tracks cohort mean scores in all of the literacy and numeracy skills. Figure 7.22 shows the gains from Year Five to Year Seven in all learning areas for the School and national males.

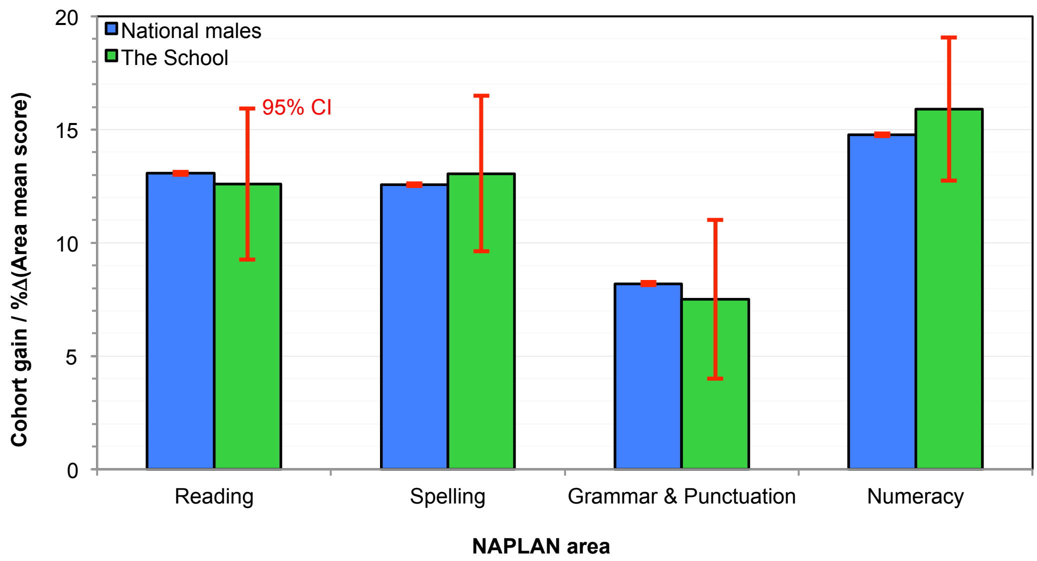


Figure 7.22. **Relative percentage cohort gain from Year Five to Year Seven (2008 to 2010).**

7.3.8.1 Summary of NAPLAN cohort gain data: Comparing the School and males nationally (2008 to 2010 and 2010 to 2012)

i) Cohort Gain, the students at the School and males nationally: From Year Five to Year Seven (2008-10)

For the four areas (excluding Persuasive Writing), the difference in cohort gain between the School and males nationally is about one per cent (relative). None of these differences (between the males at the School and males nationally) in cohort gain are statistically significant, since the 95% CI for the males at the School is approximately ±3.3% (relative).

ii) Cohort gain, the School and males nationally: From Year Five to Year Seven (2010 to 2012). Figure 7.23 shows the percentage change from Year Five to Year Seven (Cohort A) between 2010 and 2012.

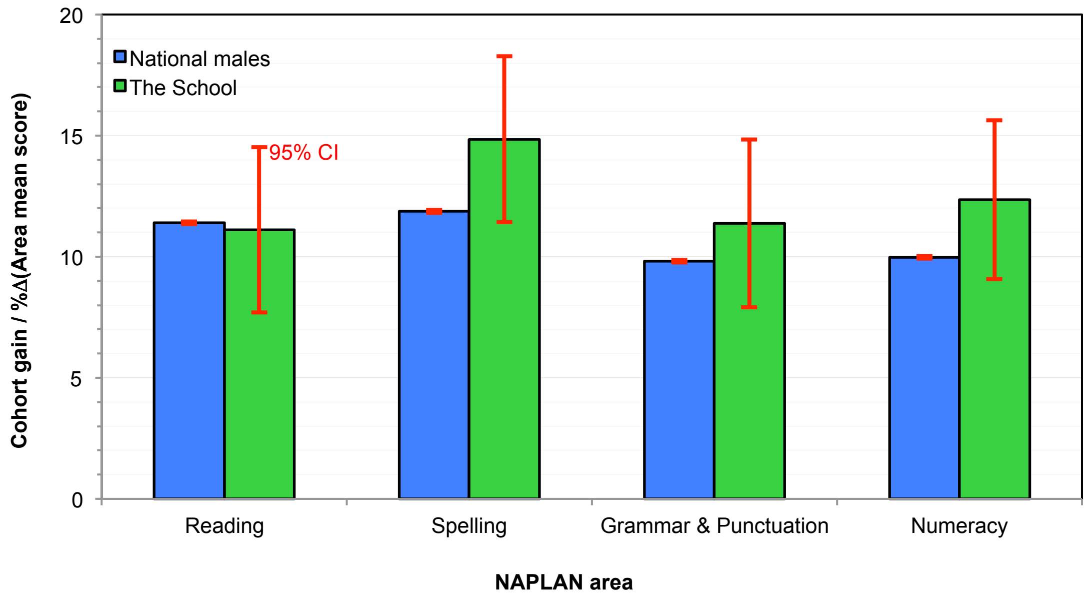


Figure 7.23. **Relative percentage cohort gain (Cohort A) from Year Five to Year Seven between 2010 and 2012.**

For the NAPLAN area of Reading, the difference in cohort gain between the students at the School and males nationally is negligible, less than 0.5%. Certainly this margin is not statistically significant since the 95% CI for the School is approximately ±3.3%. For the areas of Spelling, Grammar and Punctuation, and Numeracy, the difference in cohort gain between the School and males nationally is slightly larger than for Reading, at about +2.5%. However, since the 95% CI for the School is approximately ±3.3%, these cohort gain differences are still not statistically significant at the $p < 0.05$ level.

iii) Cohort Gain, the School and males nationally: From Year Seven to Year Nine (2008 to 2010 – non-laptop cohort). Figure 7.24 shows the relative percentage change from Year Seven to Year Nine between 2008 and 2010.

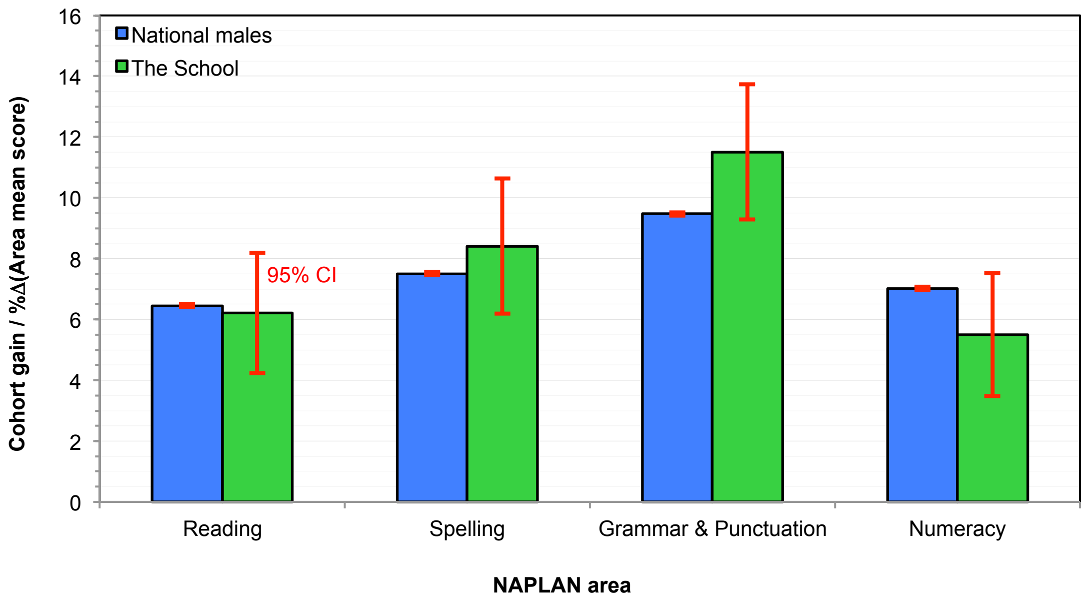


Figure 7.24. **Relative percentage cohort gain from Year Seven to Year Nine between 2008 to 2010.**

For the area of Reading, the difference in cohort gain between the School and males nationally is negligible, at less than +0.5%. This is not statistically significant since the 95% CI for the School is approximately ±2.0%. For the areas of Spelling and Grammar and Punctuation, the difference in cohort gain were not statistically significant at the $p < 0.05$ level.

For the area of Numeracy, the result is unusual in that the cohort gain achieved by males nationally was greater than that achieved by the School. In absolute terms this gain represents six marks; and relative terms, 1.5%. Compared to the 95% CI for the School cohort gain, ±12 marks (absolute) and ±2.0% (relative), the cohort gain margin is not statistically significant at the $p < 0.05$ level.

iv) Cohort gain, the School and males nationally: From Year Seven to Year Nine (Cohort B) 2010 to 2012. Figure 7.25 shows the relative percentage change from Year Seven to Year Nine between 2010 and 2012.

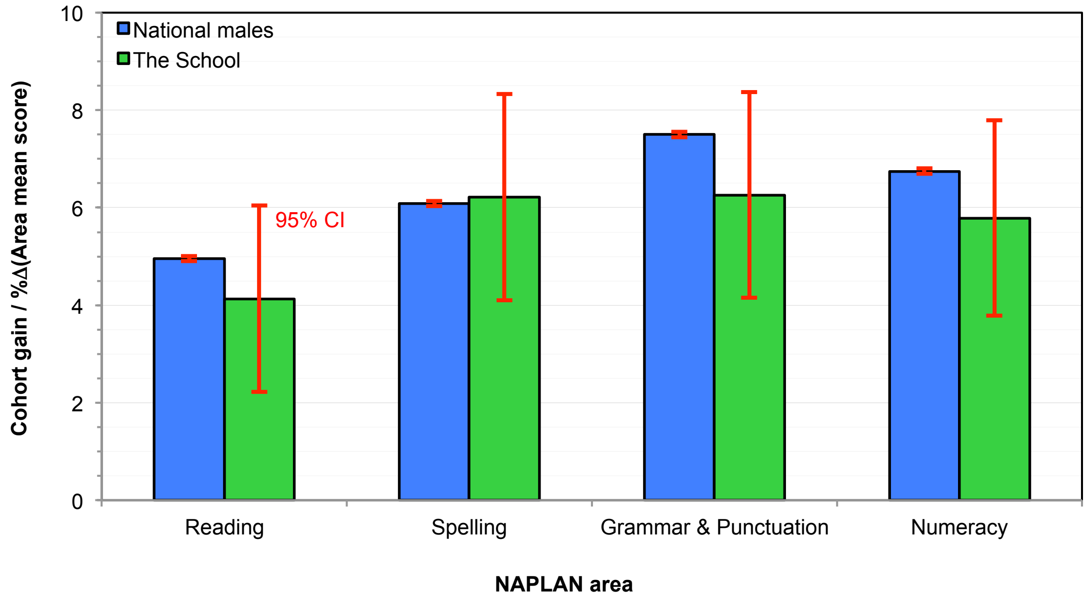


Figure 7.25. **Relative percentage cohort gain from Year Seven to Year Nine (Cohort B) between 2010 and 2012.**

For three of the four areas, Reading, Grammar and Punctuation, and Numeracy, the cohort gain for males nationally exceeded those of the School. For these three areas, the national cohort gain exceeded the School cohort gain by about 1.0%. For the other area, Spelling, the School cohort gain exceeded that of males nationally by 0.1%. Because the 95% CI for the School cohort gain results is approximately ±2.0%, none of these differences in cohort gain is large enough to be statistically significant at the $p < 0.05$ level.

v) Overall

In all cases, the differences in cohort gains between the School and males nationally were not statistically significant. Section 7.3.9 will compare the School and males nationally using a pooled data approach.

7.3.9 NAPLAN cohort gain data: Comparing the School and males nationally using pooled data

Pooling the data pertaining to the four individual areas into aggregated (four-areas) cohort gains generates larger numbers from the Schools perspective, and therefore opens up avenues for further statistical analysis. More meaningful comparisons are possible between pre-1:1 laptop cohorts with post 1:1 laptop cohorts. Figures 7.26 to 7.29 present this approach for the following years and cohorts:

- Years Five to Year Seven (2008 to 2010);
- Year Five to Year Seven (2010 to 2012 – Cohort A);
- Year Seven to Year Nine (2008 to 2010); and
- Year Seven to Year Nine (2010 to 2012 – Cohort B).

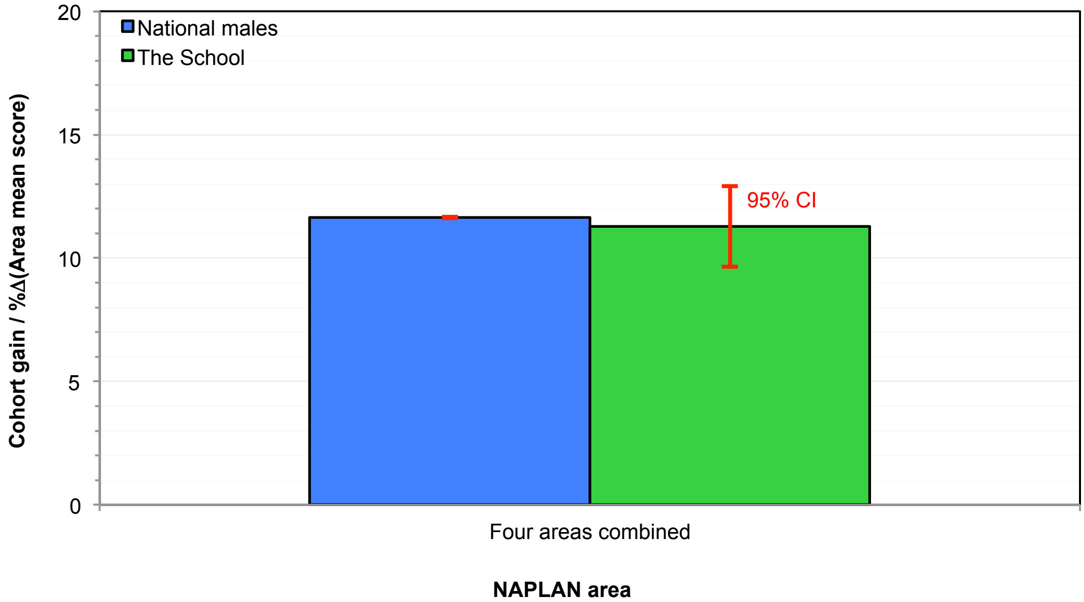


Figure 7.26. **Relative percentage cohort gain from Year Five to Year Seven (2008 to 2010).**

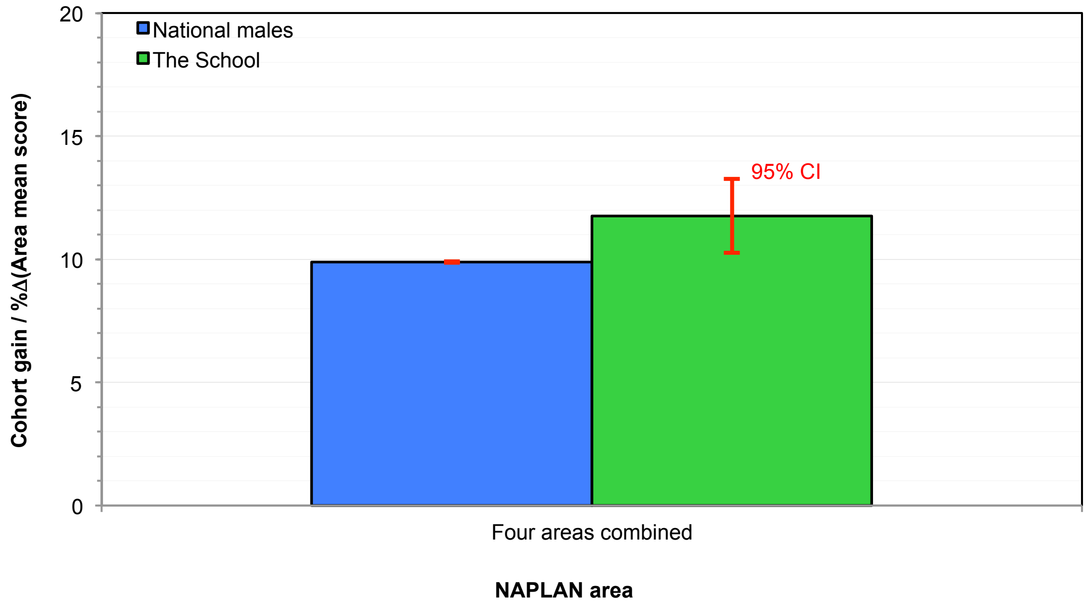


Figure 7.27. **Relative percentage cohort gain from Year Five to Year Seven (Cohort A) 2010 to 2012.**

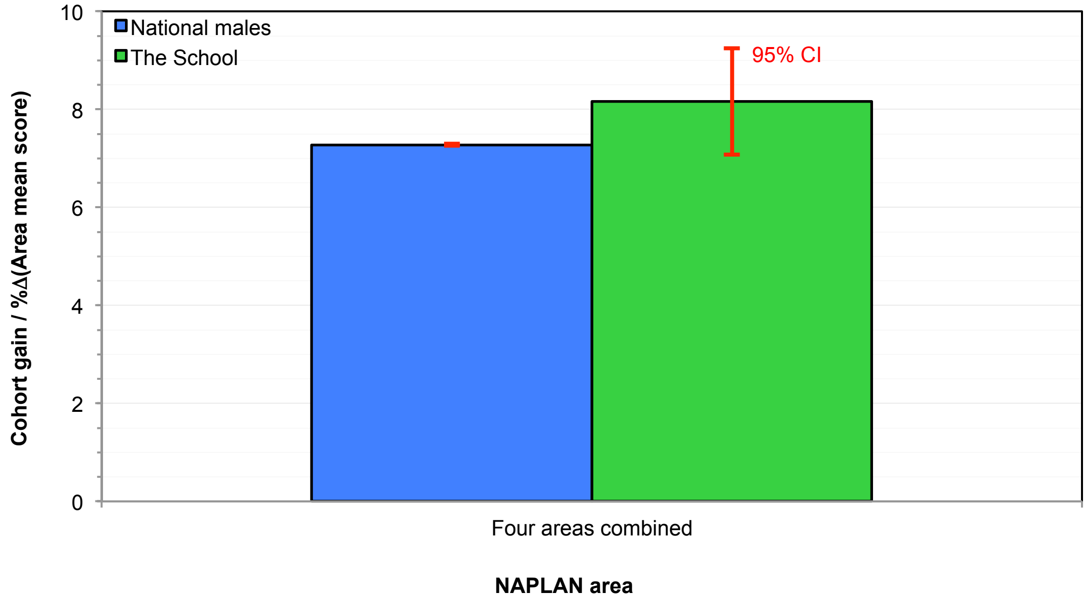


Figure 7.28. **Relative percentage cohort gain from Years Seven to Years Nine (2008 to 2010).**

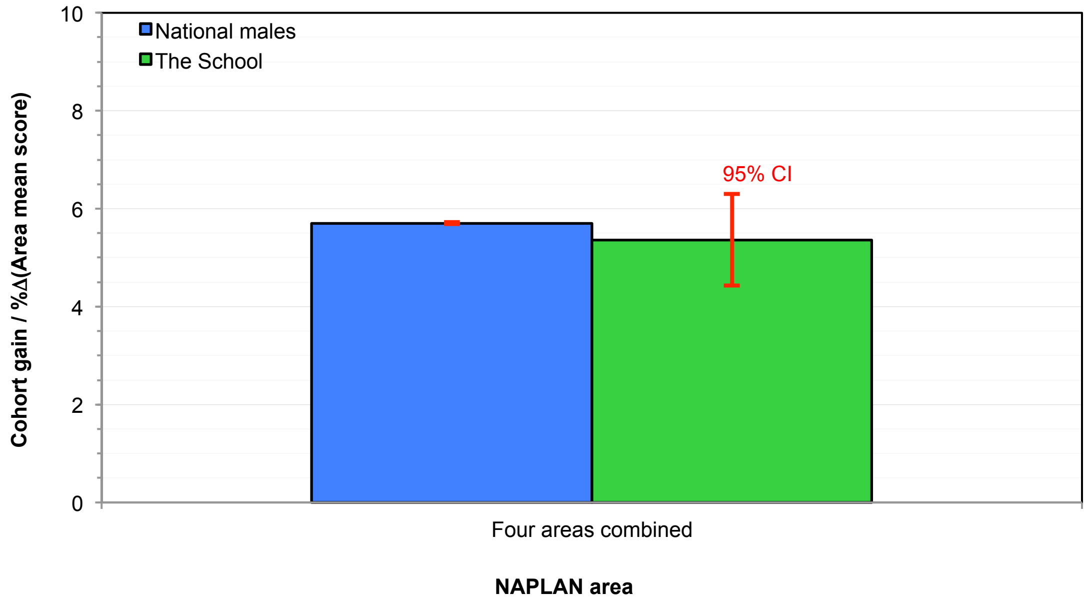


Figure 7.29. **Relative percentage cohort gain from Years Seven to Years Nine (Cohort B) 2010 to 2012.**

7.3.9.1 Summary of the pooled NAPLAN data: Cohort gain, the School and males nationally

i) Pooled Data - Cohort gain, the School and males nationally: From Year Five to Year Seven (2008 to 2010).

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. Neither did the overall analysis of cohort gain, after pooling the data for the four separate areas.

ii) Cohort gain, the School and males nationally: Year Five to Year Seven (Cohort A) 2010 to 2012.

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. However, after pooling the data for the four separate areas, the overall analysis of cohort gain revealed that the students at the School cohort gain was greater than that of males nationally, to a statistically significant extent ($p < 0.05$).

iii) Cohort gain, the School and males nationally: From Year Seven to Year Nine (2008 to 2010).

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. However, after pooling the data for the four separate areas, the overall analysis of cohort gain revealed that the School, cohort gain was greater than that of males nationally, to a statistically significant extent ($p < 0.05$).

iv) Cohort gain, the School and males nationally: Year Seven to Year Nine (Cohort B) 2010 to 2012.

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. Neither did the overall analysis of cohort gain, after pooling the data for the four separate areas.

v) Overall conclusion

The area-by-area analysis of cohort gain undertaken did not provide any definitive indication that the School outperformed national data in terms of cohort gain. However, when all of the four learning areas were pooled, the uncertainty bars (representing 95% CI) were reduced by approximately a factor of two. This procedure increases the likelihood of discerning statistically significant differences between the students at the School and males nationally, satisfying the criterion of $p < 0.05$. This component of the analysis, therefore has exploited a statistical 'trade-off' between resolution and uncertainty in order to elicit quantitative evidence that in two cases out of four, the difference was indeed significant. In two cases (i.e., Year Five to Year Seven, 2008 to 2010; and Year Seven to Year Nine, 2010 to 2012), the overall difference between the students at the School and males nationally is not statistically significant. In the other two cases, (i.e., Year Five to Year Seven, 2010 to 2012; and Year Seven to Year Nine, 2008 to 2010), the students at the School have outperformed males nationally to a statistically significant extent.

7.3.10 NAPLAN cohort gain data: Comparing the students at the School over 2008 to 2010 and over 2010 to 2012

The following section considers the cohort gains in relative terms. Figure 7.30 plots the cohort gain data as a percentage for the 2008 to 2010 cohort (without laptops) compared to the 2010 to 2012 (Cohort A) as part of the 1:1 laptop implementation. None of the differences in cohort gain between the two separate groups of students from the School is significant (at the $p < 0.05$ level).

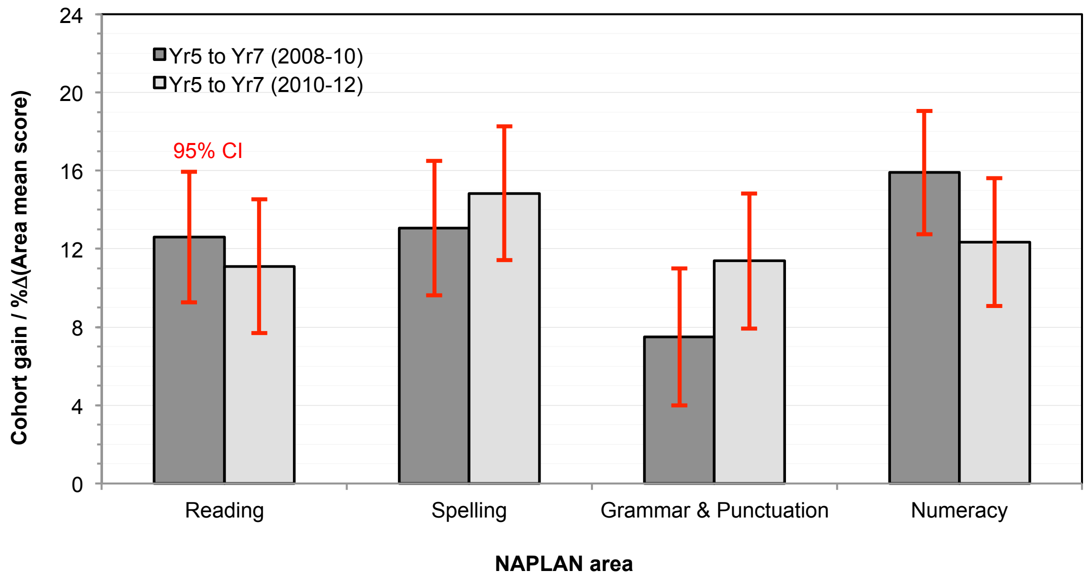


***Figure 7.30.* The Schools relative percentage cohort gain from Year Five to Year Seven: Comparison of 2008 to 2010 with 2010 to 2012 (Cohort A).**

The following section also considers the cohort gains in relative terms. Figure 7.31 plots the cohort gain data as a percentage for the 2008 to 2010 cohort (without laptops) compared to the 2010 to 2012 cohort as part of the 1:1 laptop implementation.

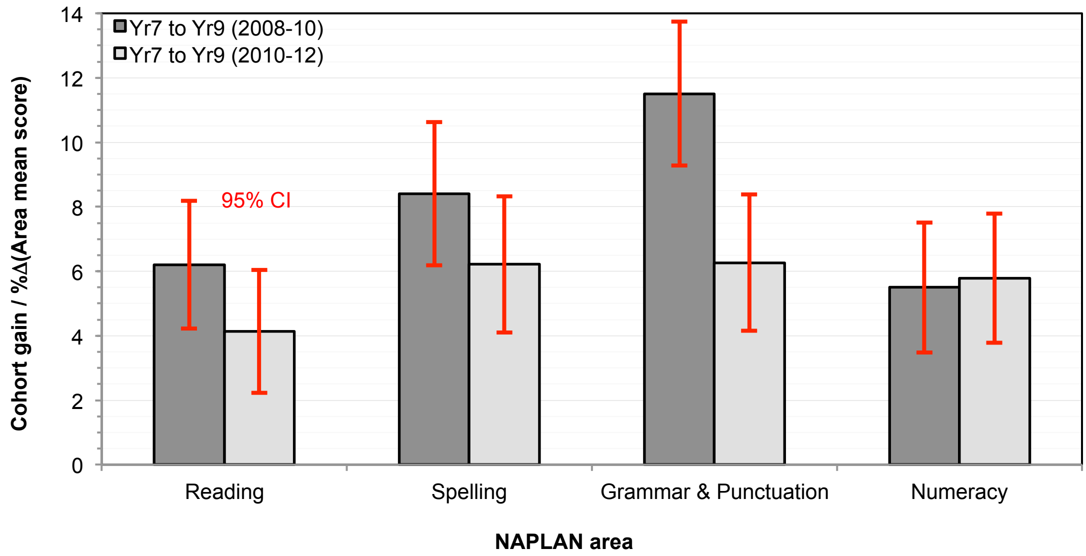


Figure 7.31. **The Schools relative percentage gain from Year Seven to Year Nine: Comparison of 2008 to 2010 with 2010 to 2012 (Cohort B).**

The cohort gain in difference for Grammar and Punctuation is significant at the $p < 0.01$ level and is shown in Table 7.14. For the other three subjects the differences are not significant (at the $p < 0.05$ level).

Table 7.14

One-Way ANOVA for Summary Data Test Results for Year Seven to Year Nine Cohort Gain Data Comparing the 2008 to 2010 Period with the 2010 to 2012 Period

Cohort Gain	Area	School 2008-10			School 2010-12			ANOVA Results			
		N	ΔMean (%)	Std. Dev. (%)	N	ΔMean (%)	Std. Dev. (%)	Δ [(2010-12) - (2008-10)] (%)	95% C.I.	F	Sig.
Δ (Year 7 to Year 9)	Reading	134	6.2	11.8	135	4.1	11.5	-2.1	1.9	2.185	0.141
	Spelling	134	8.4	13.1	134	6.2	12.7	-2.2	2.2	1.948	0.164
	Grammar & Punctuation	134	11.5	12.9	134	6.3	12.6	-5.2	2.2	11.14	0.001**
	Numeracy	134	5.5	12.0	135	5.8	12.0	0.3	2.0	0.042	0.838

Note. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

(i) The students at the School, Year Five to Year Seven, cohort gain: Comparing 2008 to 2010 with 2010 to 2012.

For the two areas Reading and Numeracy, the 2008 to 2010 gain was marginally greater than the 2010 to 2012 gain. For the other two areas, Spelling, and Grammar and Punctuation, the 2010 to 2012 gain was greater than the 2008 to 2010 gain. But none of these differences were statistically significant.

For the two areas Grammar and Punctuation, and Numeracy, the difference in gains was slightly larger, at 18 to 20 marks (absolute) and about 3.7% (relative). Nevertheless, since the 95% CI for both the 2008 to 2010 and the 2010 to 2012 School results was about ±17 marks (absolute) and ±3.4% (relative), none of the differences are statistically significant at the $p < 0.05$ level.

This combination of results for Year Five to Year Seven Cohort Gains, i.e. 2008 to 2010 have the best results for two areas, and 2010 to 2012 have the best results for the other two areas. Two of the gains differences are small in size (Reading and Spelling). Of these, one shows the 2008 to 2010 cohort to have greater growth (Reading) and one (Spelling) shows the 2010 to 2012 cohort to have greater growth. This same pattern is observed with Grammar and Punctuation, and Numeracy which display larger gaps. Overall, there is a real mix of results, with nothing systematic even suggested.

Underlying reasons for cohort gains can be complex, involving factors such as teacher knowledge and skills, and student capabilities. It is not possible at this time to untangle the impact of the 1:1 laptop program within the context of this complexity. It should be noted that the NAPLAN program is used to identify regions and schools that have greatest need for additional resources rather than relatively small scale improvement initiatives.

ii) The students at the School, Year Seven to Year Nine, cohort gain: Comparing 2008 to 2010 with 2010 to 2012

For the three areas Reading, Spelling and, Grammar and Punctuation, the 2008 to 2010 gain was greater than the 2010 to 2012 gain. For the remaining area, Numeracy, the 2010 to 2012 gain was greater than the 2008 to 2010 gain by a 0.3%. However, the only statistical significant difference was for Grammar and Punctuation area. For the two areas Reading and Spelling, the difference in the gains was 11 marks (absolute) and about 2% (relative). Since the 95% CI for both the 2008 to 2010 and the 2010 to 2012 School results was about ±12 marks (absolute) and ±2.1% (relative), the difference in gains is not statistically significant at the $p < 0.05$ level. For the area Grammar and Punctuation, the difference in gains was 26 marks (absolute) and 5.2% (relative). In this case, a One-Way ANOVA for

Summary Data test (as seen in Table 7.14) confirmed that this margin between the 2008 to 2010 cohort gain and the 2010 to 2012 cohort gain was statistically significant at the $p < 0.01$ level.

For the Year Five to Year Seven cohort gains, the overall results were mixed, with no qualitative support of a systematic difference in performance between the two groups of male students from the School. This contrasted with the Year Seven to Year Nine overall cohort gain results. For three of the four areas, the 2010 to 2012 cohort gain is smaller than for 2008 to 2010; and for the fourth area (Numeracy) there was essentially no difference. For one of the areas (Grammar and Punctuation), the difference was significant.

The underlying reasons for this statistically significant decline in gains in Grammar and Punctuation can be difficult to pinpoint. Considerations such as whether students in this cohort were taught literacy in a particular approach, or may have previously 'missed out' on key literacy fundamentals at an early age, may have had an impact on literacy, or in this instance, grammar and punctuation. The approach of pooling the data pertaining to the four individual areas, into an aggregated (four-area) cohort gain is now applied.

7.3.10.1 Pooled data cohort gain at the School: Comparing Year Five to Year Seven (2008 to 2010) with Year Five to Year Seven (Cohort A) 2010 to 2012

The four area combined analysis of cohort gain (see Table 7.15) revealed no statistically significant differences between the two groups at the School.

Table 7.15
Pooled School Cohort Data Year Five to Year Seven 2008 to 2010 and for 2010 to 2012

Cohort Gain	Area	School 2008-10			School 2010-12			ANOVA Results		
		N	ΔMean	Std. Dev.	N	ΔMean	Std. Dev.	Δ [(2010-12) - (2008-10)]	F	Sig.
Δ (Yr 5 to Yr 7)	4 Areas Combined	212	63.0	74.7	215	62.0	74.0	-1.0	0.019	0.89

Note. Yr 5=Year Five, Yr 7=Year Seven. 'One-way ANOVA for summary data' test results for pooled cohort gain data, the School Year Five to Year Seven, 2008 to 2010 and for 2010 to 2012.

Figure 7.32 shows the relative percentage gain from Year Five to Year Seven. The difference in cohort gain is not significant at the $p < 0.05$ level.

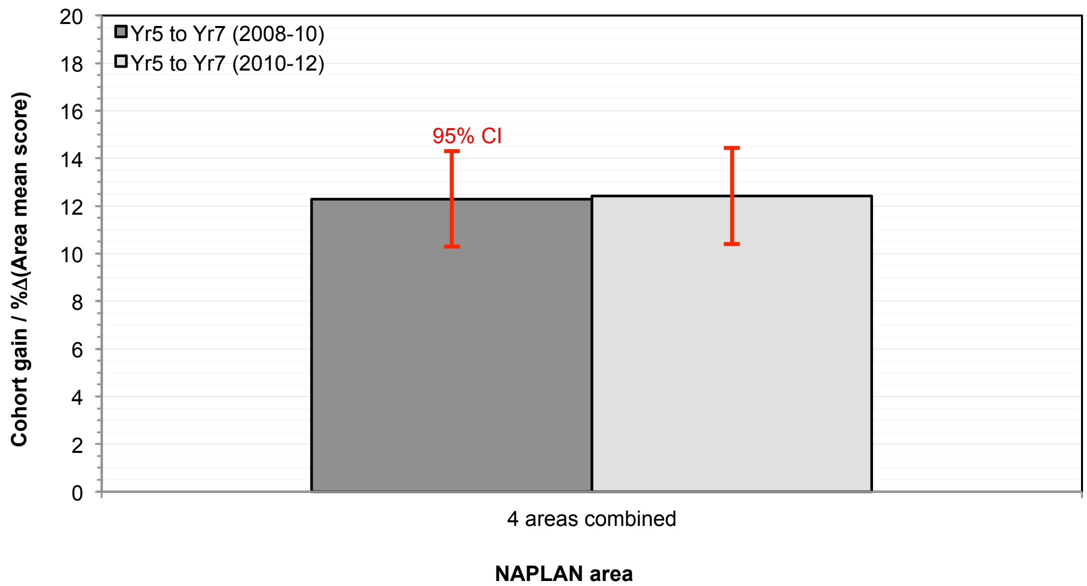


Figure 7.32. **School relative percentage cohort gain from Year Five to Year Seven: Comparing 2008 to 2010 with 2010 to 2012 (Cohort A).**

7.3.10.2 Pooled data cohort gain at the School: Comparing Year Seven to Year Nine (2008 to 2010) with Year Seven to Year Nine (Cohort B) 2010 to 2012

The four area combined analysis of cohort gain (see Table 7.16) showed a statistically significant difference between the two groups.

Table 7.16
Pooled School cohort data Year Seven to Year Nine 2008 to 2010 and for 2010 to 2012

Cohort Gain	Areas	School 2008-10			School 2010-12			ANOVA Results		
		N	ΔMean	Std. Dev.	N	ΔMean	Std. Dev.	Δ [(2010-12) - (2008-10)]	F	Sig.
Δ (Yr 7 to Yr 9)	4 Areas combined	536	43.8	72.5	536	32.3	72.3	-11.5	6.76	0.009

Note. Yr 5=Year Five, Yr 7=Year Seven. 'One-Way ANOVA for Summary Data' test results for pooled Cohort Gain Data, the School Year Seven to Year Nine, 2008 to 2010 and for 2010 to 2012. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

Figure 7.33 shows the relative percentage gain from Year Seven to Year Nine. The difference in cohort gain is significant at the $p < 0.01$ level.

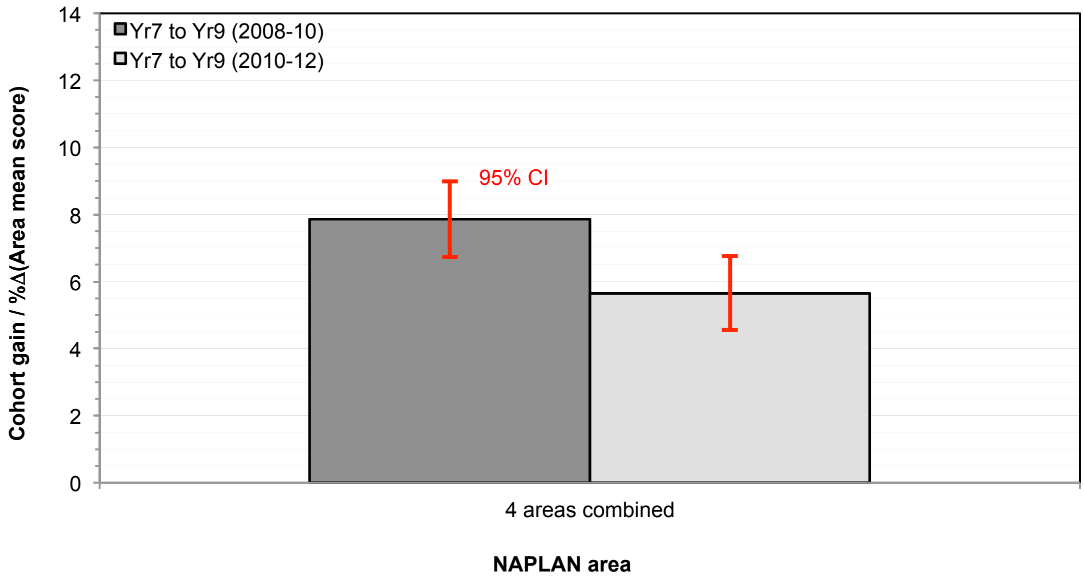


Figure 7.33. **School relative percentage cohort gain from Year Seven to Year Nine: Comparing 2008 to 2010 with 2010 to 2012 (Cohort B).**

7.3.10.3 Summary of the pooled data analysis

What the analysis has shown is that there was some diminution in some areas of NAPLAN performance between the 2008 to 2010 cohort passing from Year Seven to Year Nine, to the 2010 to 2012 cohort passing from Year Seven to Year Nine. The diminution was seen to be statistically significant at the $p < 0.01$ level for both (a) Grammar and Punctuation, and (b) also for the overall pooled results of all four areas (excluding Persuasive Writing).

7.4 Conclusion

This chapter has sought to provide insights into the extent to which the 1:1 laptop initiative has (a) improved literacy and numeracy outcomes, and (b) enhanced learner motivation and engagement. Ultimately, the chapter has addressed research question three, namely: What educational impact is there on student learning outcomes? Focusing on two cohorts, the chapter has facilitated a comparison between junior and middle school experiences of the 1:1 initiative with respect to outcomes and engagement.

Analysis of literacy and numeracy outcomes for cohorts A and B was multi-faceted and considered how each cohort performed over time:

- pre- and post- 1:1 laptop implementation;
- in comparison to other cohorts at the School; and
- in comparison to national benchmarks.

These comparisons involved disaggregated data (for each of the five learning areas) and aggregated data (pooled). The comparisons also included two approaches in which to gauge the overall performance of the cohort mean scores over time.

The gains achieved by Cohort B were significantly less than those achieved by the 2008-2010 (Year Seven to Year Nine) School cohort, in the learning area of Grammar and Punctuation (ANOVA, $p < 0.01$). In contrast, Cohort A achieved noteworthy gains between 2010 and 2012 (Year Five to Year Seven) in all learning areas except for Reading.

Self-reported views revealed perceived increases in engagement and motivation towards learning in both cohorts as a result of the 1:1 laptop initiative. These perceptions were reported consistently across the three years of the study. In attempting to better understand why students were consistently positive towards the 1:1 laptop initiative, qualitative data suggested that laptops may have given students increased opportunities to be self-directed and/or employ learning styles which were more suited to them (e.g., ‘independent’ preferences commonly found in the literature on gender differences). Although increased student engagement and motivation towards learning do not necessarily translate into deeper and richer learning outcomes, the results are heartening, particularly as teachers also acknowledged the positive impacts that laptops could have on engaging and motivating students. It should be noted that perceived levels of student engagement and motivation towards learning were consistently greater for Cohort A than for Cohort B.

This data should be treated with some caution, as there were variations in the extent to which each learning area embraced the 1:1 laptop initiative. In addition, classroom observations indicated inconsistencies in how individual teachers promoted and managed the use of laptops in their classroom. Consideration of related educational outcomes, for example, digital literacy, communication skills and problem solving, would also be useful in future research. However, with these caveats, the analysis can make a contribution to the literature.

Correlating the implementation of 1:1 laptops at the School with improvements in learning is problematic. Whilst Cohort A slightly improved in terms of its overall NAPLAN performance in comparison to national benchmarks, Cohort B weakened in comparison to national benchmarks and remained stable in relation to previous and subsequent year levels. In saying this, Cohort A, a weaker cohort in comparison to other NAPLAN years, seems to have had a more positive experience with the 1:1 laptop initiative than Cohort B both in terms of their perceptions of levels of engagement and motivation, and their performance in standardised literacy and numeracy examinations. There may have been a number of reasons for these differences, not least the reality that Cohort B commenced the 1:1 initiative at precisely the time that they were making the transition from primary to middle school. There may be lessons to be learnt in the *timing* of implementations for mobile devices in schools. This issue will be addressed in the following chapter.

Comparison between the School and national standards revealed that the School performed favourably in both cohorts in all five learning areas. This indicates that good teaching and supports are in place. Whether these preconditions are necessary for the implementation of mobile learning initiatives may be a worthy question for future research. The next chapter will discuss the implications of these findings in the context of the study’s research questions.

CHAPTER 8. Discussion

8.1 Chapter Overview

The purpose of this discussion chapter is to present the main themes from the four findings chapters and to set these within a contemporary research context as defined by the literature review. Four research questions directed the study that investigated how students utilised their laptops, teacher engagement with the laptop technology for learning, the educational impacts on literacy and numeracy outcomes and the implementation differences in a junior and a middle school setting. This chapter focuses on addressing research question five: "What implications do the findings from research questions 1, 2, 3 and 4 have for the future inclusion of 1:1 initiatives in schools?" The chapter endeavours to discuss the findings, acknowledging broader settings seeking to address the "so what?" that should guide both applied and theoretical research.

8.2 Key Findings

The study involved a sample of male students, from one school, their teachers and parents. However, the research questions, which investigated how students and teachers used laptops, offer an authentic account for the broader educational community.

The study adopted a mixed methods approach, which combined qualitative and quantitative techniques. This approach helped to ensure that the research questions were adequately addressed. The research aimed to investigate a 1:1 laptop program in a naturalistic setting as a longitudinal case study. The study sought to be gauged in relation to its credibility, transferability, dependability and confirmability (Trochim & Donnelly, 2006). The key findings of the study taking into account the five research questions are summarised in Table 8.1 to Table 8.5.

Table 8.1
Key Findings Relating to Research Question One

1. How do boys utilise their laptops for learning?
• Students reported greater independence in learning with the use of laptops. • Students used laptops creatively to develop documents, animations, digital artifacts, visual graphics, movies and presentations. • Students used email as their preferred communication tool for school, whilst Skype and Facebook were used for communication purposes outside of school. • Students used email as the preferred mode of electronic communication with teachers. • Students exhibited a reliance on the Web to inquire. • Students expressed a reluctant attitude towards accepting help from parents, believing they had an inferior skillset. • Students indicated there had been a positive change in learning. They felt a greater sense of engagement and motivation towards learning. Teacher participants agreed that this was the case, although they maintained a need for balance in using ICT. • Students expressed that using laptops made learning enjoyable, provided an efficient way to learn, and improved their ability to access a greater amount of information for learning. • Students showed a higher level of proficiency in using ICT by the end of the study.

In confronting research question one the study revealed that students from both cohorts enjoyed using laptops for learning. Regardless of the possible distractions attached to using a laptop for learning, learner engagement, independence and ICT proficiency all increased. Students were reluctant to ask for parent help when using laptops, which is consistent with the identified theme of parent alienation. Furthermore, students articulated that the effectiveness of a 1:1 laptop program depended on how teachers used laptops to facilitate learning when teaching and managing a classroom of boys. Students believed a teacher needed to be active, engaging and have good classroom management skills in a 1:1 laptop environment.

Table 8.2
Key Findings Relating to Research Question Two

2. How are teachers engaging laptop technology for educational purposes?

- Teachers indicated students used laptops predominantly for managing and operating, investigating and creating with ICT.
- Teachers used a range of assessment methods when using laptops, including word processed documents, assignments, essays, investigations, presentations and a shift by the third year of the study to the use of subject area online assessments. Overall, high stakes summative tests were completed by pen and paper.
- Teachers facilitated an environment where students used laptops between 10-50% of lesson time by the third year of the study.
- Observations suggested teachers used laptops sparingly to tailor or differentiate learning for their students. This finding was in conflict with the views expressed in teacher interviews, where participants claimed to configure tailored and differentiated environments for their students.
- Teachers' self-reported use of laptops as a scaffolding tool to support higher order thinking declined marginally as the study progressed. However, teachers continued to recognise the importance of integrating higher order thinking skills into their lessons.
- Teacher and student contact for learning post-school hours increased over the period of the research mainly through email communication.
- Digital gaming as innovative practice for teaching and learning was minimal. Teachers used web-based simulations in preference to online games.
- The ICT skills of teachers improved over the study, and they became increasingly comfortable using laptops to facilitate learning. In particular, improvement was demonstrated with the increased and varied use of the School portal.
- Teachers used laptops to increase learner independence.
- Teachers sensed collaboration and cooperation were important but resisted using ICT communication tools.

Teachers predominantly used laptops to promote student investigation and creativity. Since the introduction of the 1:1 laptop program, teachers believed there was less cooperation and collaboration in their classes. Laptops have been shown to be powerful tools (Keengwe et al., 2012) and providing each student with a laptop, presented students the ability to 'fend for themselves' and work independently. Teacher ICT proficiency increased in the areas of word processing, email, Internet, and spreadsheets. Overall, teachers were reluctant to embrace Web 2.0 technologies for teaching and learning, partly due to the systemic requirements such as the curriculum and also the fear of the unknown.

Table 8.3
Key Findings Relating to Research Question Three

3. What educational impact if any, did the 1:1 laptop program have on literacy and numeracy outcomes?
• There were no statistically significant differences in mean scores in any category when comparing Cohort A to the pre-laptop cohort. • Pooling the four areas of Spelling, Grammar and Punctuation, Reading and Numeracy for Cohort A, did not show a statistically significant difference, compared to the 2008 to 2010 pre-laptop cohort. • The reduction in mean score for Cohort B between 2010 to 2012 in the area of Grammar and Punctuation was statistically significant (ANOVA, $p < 0.01$). • Pooling the four areas of Spelling, Grammar and Punctuation, Reading and Numeracy for Cohort B, showed a statistically significant decrease in NAPLAN performance compared to the pre-laptop cohort (ANOVA, $p < 0.01$).

As mentioned in Chapter Seven, these results should be treated with some caution as the level of use of laptops varied between subjects and the overall aim of NAPLAN is to inform macro- rather than micro- level change initiatives. Therefore, correlating the data with increases to learning is challenging and underlines the need to prudently understand the contexts and nuances of specific cohorts in terms of performance.

Table 8.4
Key Findings Relating to Research Question Four

4. What differences can be identified between junior and middle school experiences in regards to questions 1, 2 and 3?

- As Cohort A transitioned through the School the level of distraction fluctuated, whereas Cohort B reported the need to focus and stay on task reducing the reported level of distraction.
- Cohort A reported an enthusiastic outlook towards education and higher satisfaction levels compared to Cohort B, consistent with the views of Johnson and Holdway (2007) who believe primary school students have higher satisfaction levels.
- Laptop use for Cohort A marginally decreased from the first year to the second year before increasing in the third year recording similar usage rates as Cohort B. Laptop use for Cohort B increased gradually over time.
- Cohort B reported using the laptop as a management tool, whereas participants from Cohort A generally did not refer to the laptop as a management tool.
- Cohort B was more reluctant to ask for help and exhibited less of a tendency to involve their parents in their academic life.
- Laptops were used for assignments, homework, digital design and visual graphics at a higher level of skill in Cohort B compared to Cohort A.
- Cohort A preferred using asynchronous (e.g., email) forms of communication, whereas, Cohort B preferred using synchronous (e.g., Skype) methods of communication with their peers when using laptops.
- A higher proportion of students from Cohort B used social media (e.g., Facebook), compared to Cohort A.
- A single teacher environment such as a primary school compared to a secondary school appears to reduce the potential of the amount of unacceptable ICT use as noted between the cohorts.
- Parents from Cohort A were more positive about the 1:1 laptop program than parents from Cohort B.

Largely, the findings suggest that introducing a 1:1 laptop program in the junior school year group compared to a middle school environment could return better results. Although levels of distraction reduced for Cohort B, the first year of a middle school student is demanding in terms of the academic and social pressures attached to the transition from a junior school to a middle school environment. Similarly, teachers in single teacher environments such as a junior school, were able to demonstrate greater consistency in the way in which laptops were used for teaching and learning, and managing distractions.

Table 8.5
Key Findings Relating to Research Question Five

5. What implications do the findings from research questions 1, 2, 3 and 4 have for the future inclusion of one to one laptop or mobile learning devices in schools?
• Using high stakes testing to gauge change in literacy and numeracy performance including drawing inferences into how ICT contributed to these changes, should be supplemented by other measures embracing 21st Century learning. • A school-wide approach towards targeted and structured professional learning emerged as a theme for improving teaching and learning with laptops. This professional learning specifically focussed on how teachers use laptops for collaboration, cooperation and differentiation. • Teachers reported classroom dynamics since the onset of the 1:1 laptop program due to the potential for distraction had placed them on a steep learning curve. • Teachers reported that they needed to develop their required knowledge and skills in using ICT for a smooth implementation of a 1:1 laptop program. • Teachers shared a concern over the possible distractions associated with the use of a laptop and emphasised the need for rules and routines within a classroom. This concern prompted the School to implement a suite of changes to deter students from playing games, thus minimising distractions. • Schools should consider the use of monitoring devices, implementing clear acceptable use frameworks, informing teachers of strategies of how to teach in a 1:1 class, and working with both the students and parents about the expectations of using laptops. • Students reported the effectiveness of the 1:1 laptop program was related to how effective teachers were in delivering their planned lesson. • Students believed an effective teacher in a 1:1 classroom needed to be mobile and active, engaging in delivery and not afraid to discipline students for contravening the Acceptable Use Framework. • Students considered teachers who delivered a style of education tailored to their needs were essential in increasing their chances of learning. • Students, teachers and parents believed a balanced approach for teaching and learning with the use of laptops was necessary. • Parent perceptions of the 1:1 laptop program in the first year and the second year suggested a concern in relation to the impact of 1:1 laptops on learning. By the third year of the study, parents had softened in their view. However, parents remained cautious about an overreliance on the use of laptops mainly due to pen and paper approaches to assessment.

There was a good deal of variability in how laptops were used in the classroom. This variability was mainly grounded in subject area traditions, teacher beliefs and teacher skills sets. The necessity to support teachers was pronounced in terms of how to use laptops for, collaboration, cooperation, differentiation and higher order learning tasks. Additionally, managing distractions in 1:1 laptop classrooms was another area in which the School addressed from both a professional learning and management perspective. Generally, parents remained cautious about the benefits of laptops for learning and some found it challenging to understand how laptops furthered learning. Finally, students believed those teachers who embraced the 1:1 laptop program, by being active and mobile in the classroom, and were engaging, provided good learning experiences.

8.3 Paradoxes

The findings articulated in the preceding four chapters are both encouraging and challenging. Every finding that corroborates the successful implementation of the 1:1 laptop program at the School accompanies something that is problematic. A useful way in which to critically evaluate the 1:1 laptop program, therefore, is to unpack some of the contradictions revealed through the findings. This approach will enable the research to both affirm the successes of the 1:1 implementation and confront the challenges. The contradictions are presented as the following five paradoxes.

a) Paradox one - Autonomy and systemic dependency of schools: The study revealed that teachers at the School had a good deal of autonomy in which to optimise the use of laptops for learning. Further, the School provided a high-quality computer network, an array of ICT hardware and software, and a well staffed ICT support system. However, the School is situated in an educational system that has entrenched measures of success and drivers for change. Performance is typically measured by a narrow set of indicators based upon student performance in standardised tests. Collection of other data on incidental learning outcomes (e.g., digital literacy, problem solving skills) would provide greater texture and richness in gauging the success of educational change initiatives, particularly those involving ICT. A comprehensive evaluation process is crucial to the proper management of educational change initiatives (Bernhardt, 2014; Darling-Hammond, 2012).

b) Paradox two - Engagement and seduction of students: While students and staff noted increases in engagement and motivation, there was also a greater potential for 1:1 devices to exacerbate student distraction. Further, while the 1:1 laptop program created an environment of student independence and arguably a greater level of self-direction, there were noticeable deficits in the use of 1:1 devices for communication between students. These deficits include using ICT to build and share knowledge and collaborate in groups. Finding an appropriate balance on when and how to use laptops is an ongoing challenge for teachers.

c) Paradox three - Hopes and fears of Web 2.0: The introduction of the 1:1 laptop program at the School was designed to enhance opportunities to communicate and connect via 21st century learning. However, the study found that collaboration and cooperation in classes actually decreased over the three years. Embracing Web 2.0 technologies requires a level of pedagogical knowledge that is typically not part of the skill set of graduating or experienced teachers. Although it is acknowledged many universities explore Web 2.0 technologies in their pre-service training, there is little evidence at the School of enthusiasm of Web 2.0 in teaching and learning.

d) Paradox four - Transformative and conservative pedagogical practices: The 1:1 laptop initiative at the School proved successful on measures of motivation and engagement. However, on these indicators it is noted that middle school students had a less positive experience than their junior school counterparts. An important consideration in planning a change initiative was found to be timing, both in staff and student readiness and in the context of other school priorities. The research noted inconsistencies in the extent to which teachers used laptops in practice. The School has reached a point where it needs to build a common laptop implementation philosophy, which will unite teaching communities and create a more consistent approach to the adoption of 1:1 devices.

e) Paradox five - Integration and alienation of parents: Although the School allocated significant resources to building a sense of community to help drive the 1:1 laptop initiative, it is evident that parents in particular felt a sense of alienation from their child's education. There are certainly opportunities for the School to improve student communication with parents and parent knowledge of learning with laptops (e.g., communication of the vision or goals of the program).

8.4 A Model for Understanding how Policy Intersects with Reality

The empirical research literature on 1:1 laptop programs (e.g., Bebell & O'Dwyer, 2010; Hatakka et al., 2013; Lei & Zhao, 2008; Newhouse, 2014) provides a thorough foundation on which to consider the worth of implementing laptop programs in schools. Due to the multifaceted nature of schooling and time bound requirements for the teaching of content, laptop programs can create tension in an outcomes-focused space. Frameworks have been developed to conceptualise the use of ICT such as that proposed by Bruce and Levin (1997), where the use of ICT is differentiated into meaningful categories.

The model underpinning this study uses a metaphor of a ‘set of cogs’ and ‘spanners in the works’ inhibiting the cogwheels from turning in unison. This framework is shown in Figure 8.1 via the diagrammatic use of the cogwheels and spanners. The four cogs of leadership, creative teachers, inquisitive students and National and State policy directions represent what the study has found to be crucial in the creation and maintenance of a quality 1:1 teaching and learning environment. Each cog offers opportunities to enhance well-managed student-centred approaches to learning through the use of mobile devices. Using the cogwheels as a conceptual framework emphasises the goals within each of the cogs with an overarching goal of developing students as self-regulated, reflective and life-long learners. Wedged into each of the cogs are the ‘spanners in the works’, the possible hindrances attached to a 1:1 laptop program for schools. These are essentially the paradoxes discussed previously. Confronting these spanners will ultimately lead to a smoother functioning of the machinery of 1:1 laptop schools.

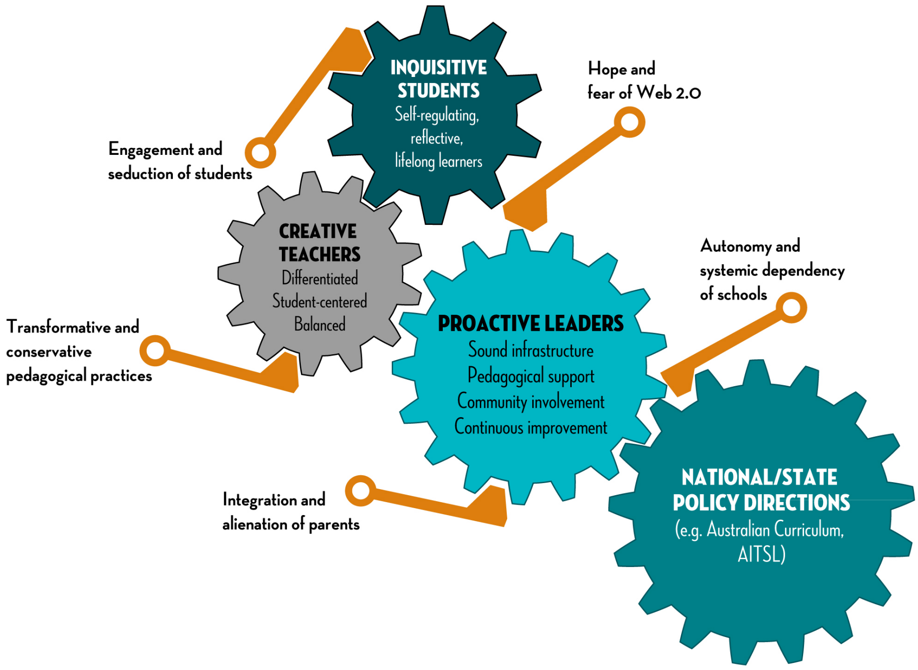


***Figure 8.1.* A model for 1:1 laptop implementation based on the core themes to emerge from the research.**

The conceptual framework proposed in this thesis provides insights into areas of significance for future 1:1 implementations and builds on previous frameworks of others (ACARA, 2010a; Bruce & Levin, 1997; Lei & Zhao, 2008; MCEETYA, 2006; Mishra & Koehler, 2006). The paradoxes (spanners) are now discussed in detail.

8.5 Paradox One: Autonomy and Systemic Dependency of Schools

Teachers and parents were concerned with the issue of assessment and the fundamental requirement to complete tests (e.g., NAPLAN and Western Australian Certificate of Examinations - WACE) in a written format. Most assessments at the School were conducted using a conventional pen and paper approach, whereas the majority of task-based assignments were completed using laptops. This predicament uncovered another pertinent issue of the problems linked with measuring academic outcomes when using laptops for learning.

Using NAPLAN as an indicator to monitor literacy and numeracy performance at the School was important for school leadership as the data formed the basis of designing improvements for student learning. This approach is consistent with Wildy and Clark's (2012) recommendation that schools need to adopt a long-term view, taking time to understand the data, to inform change. However using NAPLAN results as the primary measure in determining the impact of the laptop program was problematic. NAPLAN is not designed to test students' digital competencies or creativity, and it is, therefore, difficult to pinpoint if using laptops had caused students' NAPLAN scores to increase or decrease. Factors such as the impact of the teaching and learning program (Schleicher, 2011), previous learning deficits and family backgrounds (Hartas, 2011) could potentially play a part in the variability of these results. As seen at the School, the rate of improvement between the two cohorts was different. The rate of improvement varied over time, as students shifted from a junior to a middle school setting. As shown by teacher and parent perceptions, the overwhelming fear was that lack of writing 'pen in hand time' would negatively impact on the students' written examination performance.

The study presents a suite of identifying measures that could help in measuring academic outcomes, relative to the conventional forms of assessment such as NAPLAN. Cassidy (2004) reported that how teachers approach learning situations with the use of laptops has an impact on performance and achievement of learning outcomes. Therefore, a range of strategies may need to be included when using laptops as part of an effective assessment program. The following suite of measures has the potential to provide some guidance in considering such inclusions for teachers, school leaders and tertiary institutions:

8.5.1 Assessing or measuring creativity

With a focus on 21st Century learning in education systems across the world, creativity can easily be left in isolation in the context of assessment considerations. Schools have the potential to provide rich ICT experiences to promote a culture of creativity. Sawyer (2012, p. 8) provides a sociocultural definition, "creativity is the generation of a product that is judged to be novel and also to be appropriate, useful, or valuable by a suitably knowledgeable social group." Providing students opportunities to peer review or using external judges may validate or assist assessing or measuring the examples of creativity in schools.

Typical school reporting methods do not provide students with a grade for creativity, as was the case at the School. However, what laptop programs offer is the potential to use the device as a medium to approach higher order thinking skills and simultaneously be connected with the world seamlessly. This level of global connectivity opens a range of collaborative learning opportunities with other students and professionals across the world.

Mishra and Henriksen (2013) recognised difficulties in assessing or measuring creativity due to the subjectivity in any open-ended, complex or problem solving work or higher order thinking tasks. However, in terms of a 1:1 laptop program, as demonstrated at the School, student participants exhibited high levels of creativity (e.g., creating movies and animations) through the use of ICT. Anderson and Krathwohl (2001), in their revised version of Bloom's Taxonomy considered creativity to be higher in the cognitive domain as seen in Figure 8.2.

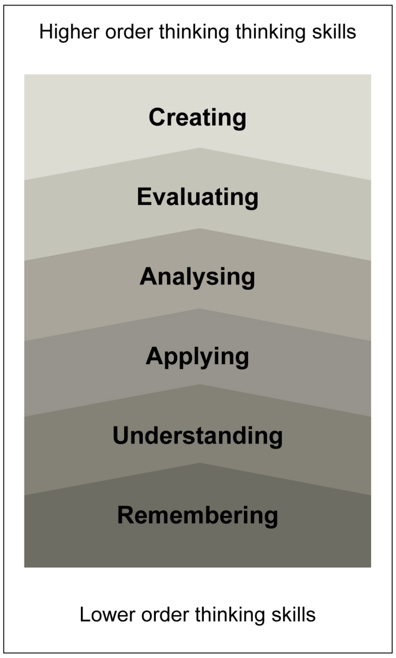


Figure 8.2. **Revised Bloom's taxonomy by Anderson and Krathwohl (2001) drawn by Churches (2009, p. 3).**

Bloom's revised taxonomy by Anderson and Krathwohl (2001) focused on the development of higher order thinking skills and are listed in the first section of

Table 8.1 (as seen below). Churches (2009, pp. 2-5) added to the revised taxonomy by providing digital examples of each element of the taxonomy. The examples examples are shown in the second section of Table 8.1, which form part of a merged example of the modifications to Bloom's taxonomy.

Table 8.6
Revised Bloom's Taxonomy by Anderson and Krathwohl (2001, pp. 67-68) and Bloom's Digital Taxonomy by Churches (2009, pp. 2-5)

Author	Remember	Understand	Apply	Analyse	Evaluate	Create
Anderson and Krathwohl (2001)	Recognising, recalling.	Interpreting, exemplifying, classifying, summarising, inferring, comparing, explaining.	Executing, implementing.	Differentiating, organising, attributing.	Checking, critiquing.	Generating, planning, producing
Churches (2009)	Bullet pointing, highlighting, bookmarking, social networking and social bookmarking	Advanced and Boolean searching, blog journaling, categorising, commenting and annotating, and subscribing	Operating, playing, uploading and sharing, and editing	Mashing, linking, validating and tagging	Blog/commenting and reflecting, posting, moderating, collaborating and networking, and testing	Programming, filming, animating, videocasting, podcasting, mixing and remixing, directing and producing, and publishing.

8.5.2 Assessing 21st century digital skills

To assess 21st century learning skills, defined previously in the literature review as skills focussing on complex thinking, learning and communication skills, the School may need to look at a broad range of measures as an indication of the impact of laptops on learning. Griffin et al. (2011, p. 24) suggested 21st century standards and assessments should consider the following 10 principles:

- align with 21st century goals;
- incorporate adaptability and unpredictability;
- be largely performance based;
- add value for teaching learning;
- make students' thinking visible;
- be fair;

- be technically sound;
- be valid for purpose;
- provide feedback to build capacity for educators and students; and
- be part of a comprehensive and well-aligned system of assessments designed to support the improvement of learning at all levels.

One of the challenges of integrating ICT into the curriculum is ensuring that developing and assessing 21st century digital skills do not negatively impact on NAPLAN and WACE performance. Using these 10 guiding principles for designing assessments focused on meaningful learning could help the School transform future assessments and learning that fosters an approach of including 21st century learning. Equally, in terms of fitting in with NAPLAN and WACE imperatives these principles could help students to improve their problem solving capacity and subsequently help their overall performance in assessments that require students to solve complex problems.

8.5.3 Post-school impact

Another feature of the 1:1 laptop program that is difficult to measure is the impact that the 1:1 laptop program may have on student development post-school. Both students and teachers indicated their level of ICT competency improved over the study. This skill development is relevant in terms of learning for the future and supporting life-long learning. Therefore, a student's preparation for post-school life could well be aided with sustained ICT rich environments as provided at the School. Teacher Participant 62 believed learning with laptops was essential for this readiness:

> We often get questioned about why we have laptops, because they are boys, they are youngsters, so why are they not using pen and paper, and I always think, when they get out into the real world, they are going to have to use laptops, ICT. Most work places do not do pen and paper, they do IT, so this is a way of teaching them from a younger age of how to use the IT that is available to them, the appropriate use of it, how to be good stewards of it, what is appropriate and not appropriate. So for me, it is more of a life skills learning thing than it is about what they are getting out of it specifically for a subject. (C622012)

With society having such a strong reliance on the use of ICT in the workforce, 1:1 laptop programs could act as early developers for the required skill acquisition students may need for learning post-school. Schools that adopt 1:1 programs might be a bridge between the student and their future position in the workforce (Kozma, 2005).

8.5.4 A visionary educative ICT agenda involving the whole school community

As indicated in the model for understanding how policy intersects with reality, schools require proactive leadership with a visionary educative ICT agenda developed with the school community. Implementing a laptop program requires a consultative approach with teachers, students and parents to create a sense of shared understanding. Developing an ICT agenda with a focus on improved learning through 21st century approaches, the continued education of staff, and communication to parents could help prepare school communities for such implementations. The community approach could be as practical as providing the following:

- informative and frequent snapshots of what is taking place in a school with the use of ICT;
- allowing parents access via school-based portals or websites to see student work;
- provision of open sessions for parents to witness the educational vision of the school when using laptops;
- parent training or coaching of key ICT aims or goals; and
- involvement of staff and external members of the community as part of an innovation network to provide the school with ideas.

The School attempted to provide these strategies to promote a greater buy-in from the students, teachers and parents involved in the 1:1 laptop program. Across the three years of the study the School was determined to minimise the chances of remaining educationally idle, falling behind in ICT standards or implementing the program for the sake of it. The significance of effective school leadership within schools is, therefore, highlighted and is supported by the available literature (e.g., Newhouse, 2012; Ottestad, 2013; Yuen, Law, & Wong, 2003).

In summary, measuring academic outcomes when harnessing 1:1 laptops for learning is complex. Using NAPLAN as an indicator provides valuable information for schools. However, the opportunity to embrace new approaches for assessing or measuring creativity; embracing 21st century learning; and involving a school community to form a visionary educative ICT agenda are some ideas schools may consider when addressing measuring the academic outcomes in a 1:1 environment.

8.6 Paradox Two: Seduction and Engagement of Students

8.6.1 The seductive power of digital technologies

Managing distractions within classrooms is not something new. Classroom control and management as explained by Charles (1981) and further discussed by Tauber (1999) are integral to effective teaching and learning. Prior to the introduction of ICT in classrooms, students could be off-task, distracted and generally disengaged. Students in the 21st century are immersed in a world of technology where social media and games are distractions that can divert their attention from learning (Hatakka et al., 2013). Managing these distractions increases classroom management exponentially as a challenge for teachers. How the School managed student behaviour with the use of ICT was complex, as students pushed the boundaries when using laptops, and there was no easy fix. This tendency is consistent with the observations of Hope (2005). An example of this was when students gained parent passwords (some parents elected to give their son their administrator password) to circumvent parental controls of their laptop. This enabled some students to be the administrator of the device and manage their laptop accordingly. The School had to act on this and apply a new level of administration, which eventually handed the control back to the School, however this took time and required external support and resourcing.

The research indicated that leisure-oriented gaming is commonplace between students in years five and nine, though mainly either offline, on mobile devices or through 3G or 4G networks. Teacher participants taking part in the study were generally unconvinced of the benefits of using digital games as a core component of their pedagogical approach. Leisure-oriented gaming had a detrimental impact on the culture of learning at the School and, according to parents and teachers at least, it was distracting for students who wanted to learn. The main reasons cited for student gaming were either boredom with the teaching approach, an inability to understand the value of subject matter and/or the existence of teaching practices that allowed gaming to flourish in the classroom.

Presenting students at the School with a personal laptop was a little like giving a set of car keys to a restless adolescent, eager to experience the thrill of the open road. Like a driving instructor explaining the road rules before handing over the keys, the School earnestly put in place policies, procedures and support mechanisms to help students on their journey. It also constructed a transparent policing system, and from time to time instituted a 'blitz' to ensure that rules were observed. To a certain extent the controlled 8.00 a.m. to 5.00 p.m. environment within the School network was successful. Contraventions of the School's Acceptable Use Policy were under control at the conclusion of the research, and there was a sense of optimism about the pedagogical possibilities of laptops. However, the risk of wasteful, off-task and even subversive uses of digital devices was ever-present both on campus and in students' homes. Students in the digital world can readily use multiple devices (e.g., mobile phones, iPads and home computers), configuring these devices to run on a variety of networks (e.g., devices linked to mobile phones that act as Personal Hotspots). Further, students can download or share videos, images and software via Bluetooth networks or memory sticks before entering the unregulated offline environment to consume content or play games.

Any 'carrot and stick' approach clearly requires a sophisticated educative dimension. However, whereas in the past, teachers and parents were able to role model appropriate behaviours and actions, in the digital world many parents and teachers feel alienated by a lack of expertise. So what can be done? This study acknowledges the management of student distraction as a critical success factor in the implementation of 1:1 devices in the classroom, and does not attempt to offer flippant 'silver bullet' solutions. The research of Bate, Macnish and Males (2012a) highlighted the need for a holistic model to the management of student distraction, which included the following: documented ICT policies and procedures; robust ICT built around safety; ongoing monitoring of how 1:1 devices are used by students; active use in the classroom; community approach; and active involvement of parents. The following 'building blocks' approach, Figure 8.3, illustrates this holistic model for managing distractions.

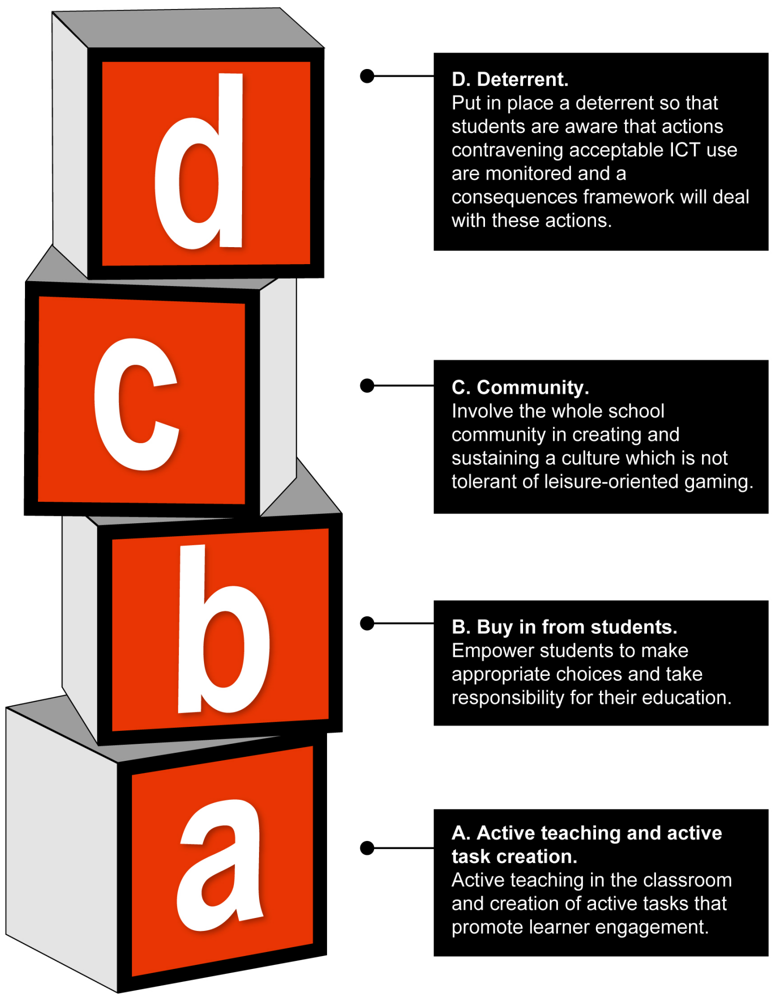


***Figure 8.3.* Building blocks for effective management of distraction in a 1:1 environment.**

The four sequential steps of the effective management of distraction model comprising of active teaching and active task creation, buy-in from students, community involvement, and deterrents to stop unacceptable use of ICT all play a role in managing distractions in a 1:1 environment.

Data from students, staff and parents collected over the course of the study suggests that policies and procedures are well documented and well understood. The selection of Apple laptops which included a parental controls feature, coupled with the work done at the School to ensure that these controls were not compromised within a networked environment, indicates a strong and effective ICT environment. Further, the e-safe monitoring program implemented after the first year of the study had a remarkable impact on reducing inappropriate behaviours on the School network, particularly in relation to pornographic material (Bate et al., 2012a). Data from parent, student and teacher survey questionnaires and interviews at the conclusion of Year One suggested a requirement for more thorough student monitoring and, as a result, the School introduced a key-logging monitoring program in Year Two. Key-logging provided the School with further information about the types of websites being accessed by students. e-Safe Systems Limited, a United Kingdom based company, was contracted to monitor student use of their laptops whilst on the School's network. e-Safe offered a key-logging monitoring service that recorded potentially suspicious images and text typed as search requests, and inappropriate websites accessed (E-Safe, 2011). The School received detailed analytics of what might be inappropriate material for evaluation, without blocking websites, and where necessary, action was undertaken.

One area identified for potential improvement was the ongoing monitoring of how the teacher engages students in using their 1:1 devices. This issue is raised by Teacher Participant 52, who believed the importance of constantly evaluating laptops use was essential in minimising distractions:

> I think with any device if we are not engaging the boys with the right activity or the right timing for an activity eventually boys do turn to gaming because they're bored in the classroom. So as much as it is a student's responsibility to stay on task, it's also the teacher's responsibility to reflect on the activity and ask them, 'Why isn't this working?' or 'Why have I not been able to keep them on task during the lesson? Is it the way I structure up my lesson? Do I need to break it down into smaller segments and feedback more often?' These are things that teachers need to ask themselves to make sure that these distractions are less of an issue. (C522012)

If students engage with interesting and well-designed activities using ICT, then the tendency for distraction will be lessened (Postholm, 2007). The appointment of an ICT specialist at the School to help teachers envision opportunities to integrate ICT had a positive impact. Further, the development of an ICT educative agenda (Vanderlinde, Van Braak, & Tondeur, 2010) which involved the whole school community, embraced the variety of ICT, acknowledged the ways in which devices interact, and discussed ICT strengths, weaknesses, opportunities and threats, generated a greater sense of ownership amongst all participants in the 1:1 implementation. Framing and implementing this educative ICT agenda is challenging in light of the raft of other priorities faced by students, teachers, parents and school administrators. However, the importance of taking the whole community on the 1:1 implementation journey is crucial (LaRose, Rifon, & Enbody, 2008).

Appropriate use of ICT transcends the management of student distraction in the classroom. It has important social and ethical implications, particularly for young people as they learn how to conduct themselves in society, and develop relationships with their peers and family. Of concern to the whole school community is the way in which values are explicitly and implicitly mediated through the Internet, particularly via pornographic and gaming content. These values will ultimately shape our future society; therefore, it is important that the whole school community engage in an educative journey that informs and helps to create a shared vision of what constitutes acceptable use of ICT and its implementation. The current research has found that young male students are curious about pornography and gaming and as such will regularly push the boundaries of what is acceptable in school settings. It is suggested that involving teachers, parents and students in the dialogue will lead to more ownership, and ultimately, success.

Regular seminars and forums, involving the whole school community could be implemented to demystify ICT and possibly re-harmonise households. Topics such as what constitutes an educational game, setting up and monitoring home networks, legal and ethical responsibilities associated with downloading material and sharing files, could all be relevant. This approach requires energy and resources, but if responsible use of ICT is key to the success of 1:1 learning environments, then whole-of-community strategies are worth considering.

8.6.2 Innovative use of ICT to engage students at the School

The potential to use ICT for creation purposes (e.g., mind-mapping, movies, music, podcasts, visual graphics, applications or animations) could be an area easier to promote to a cautious school community, where there is an understanding that ICT and creativity are commonly not used to their fullest potential (Brooks, Borum, &

Rosenørn, 2014). Applying creative approaches for using ICT rather than just using laptops to do more of the same (e.g., typing, using the Internet or creating presentations) would seem to be a good starting point for change.

One of the greatest opportunities for engaging male students in education through ICT is with digital games. Digital games can support complex generic life-long learning competencies as opposed to simply mediating content. For example teamwork, problem solving, experimentation, adaptation, creativity and reflection have all been identified as attributes of a ‘good’ game (Shute & Fengfeng, 2012). However, digital games that facilitate these higher order cognitive processes require teachers to determine first the educational value of the game and second, align the game seamlessly with educational goals. Not only does this take considerable skills, plus time and resources (Simeoni et al., 2012), it is also pedagogically risky with no guarantee of success. The default position at the School is that gaming is banned in the absence of a strong demonstrable rationale. This conservative culture may stifle innovation, but at the same time it serves the political needs of the School well. This stance is consistent with the observation made by Selwyn (2011, p. 104), that:

> The (non) use of digital technologies should be seen in the light of teachers' primary concerns of maintaining discipline and order in their classes; of ensuring that students achieve 'good' grades in external and internal assessments of learning; that classroom activities follow set curricula and meet the varied expectations of school managers, parents and other stakeholders.

The findings showed a school that was sensitive to the risks of gaming and adopted a range of successful strategies to manage these risks. At the same time, innovative use of digital educational games was rare. The School community was largely united in its desire to limit leisure-oriented gaming during school hours and did not pursue digital educational games as a valid pedagogical approach.

The 1:1 laptop program was introduced with the best of intentions to help build students' 21st century skills (DEEWR, 2012). However, the School operates in a volatile environment where success is gauged according to a relatively narrow set of measures which are collected on an annual basis. These measures largely incorporate student performance in two sets of high stakes examinations: NAPLAN, which takes place in the formative years of a student’s education in Australia, and the Western Australian Certificate of Education (WACE), held at the conclusion of Year 12 (final year of schooling in Australia). Performance in the WACE, in particular, has significant implications for student options as far as tertiary admission is concerned. Continuous assessment results obtained by students in the previous two years are moderated by the performance of a school as a cohort in the WACE examination. Effectively a school as a whole needs to perform well so as not to impact on the options of individual students. Parents seeking the best educational outcomes for their children may try to select high academic performing schools to guarantee that their child's options are not limited by what they perceive as poor cohorts in other schools. This structural feature of the Western Australian schools' sector has implications for all schools in terms of maintaining their market share. Performance in examinations, therefore, is an important factor in decision-making within the School, which is competing for students in order to be viable, grow and flourish. Academic performance as gauged through examinations means that education is tightly integrated with stated curriculum learning outcomes; and orientated towards ensuring that students perform in examinations. High stakes assessment practices put pressure on teachers to get through the curriculum (Jordon, 2008; Lim & Chai, 2008; Voogt, 2009) and teach for tests (Demetriadas et al., 2003; Liau et al., 2008; Voogt, 2009). According to Lane (2004) high stakes assessment compromises cognitively rich teaching and assessment practices. Further, the tendency of these examinations to be hand-written rather than using a laptop sends an unequivocal message to students and teachers not to become too reliant on ICT.

As discussed, one of the key indicators of success at the School is student performance in high stakes assessment. This ethos is valued by all stakeholders including parents, teachers, school leaders and even students themselves. Expending time and energy to implement and elaborate games in an already crowded curriculum was perceived by teachers as a risky strategy. Further, the School's interpretation of the local educational landscape and the broader ICT policy environment sends explicit and implicit messages to teachers shaping their pedagogical approaches in the classroom. In short, school priorities (academic excellence as determined by NAPLAN and WACE), policies (e.g., Acceptable ICT Use) and procedures (e.g., forensic monitoring) reinforced the message that gaming is risk-managed, and that innovating with digital games is on the fringe of what might be considered acceptable. The tendency for leisure-oriented games to distract students in the classroom also ‘stigmatised’ games at the School, further inhibiting the diffusion of educational gaming as an innovation. This finding is consistent with other research (e.g., Koh, Kin, Wadhwa, & Lim, 2012).

Further research into digital gaming might examine the range of educational contexts in which digital gaming is introduced paying particular attention to political and economic drivers that impact on decision-making and which ultimately affect student learning. Identification of key enablers that might encourage teachers to use digital games to innovate in the classroom could also be useful.

A number of empirical studies which demonstrate educational benefits of digital games have recently emerged (Haiyan, Pan, Hirumi, & Kebritchi, 2012; Hess & Gunter, 2013a; Ke, 2008; Miller & Robertson, 2011). These studies encourage educators to innovate with confidence. However, this study introduces a socio-cultural perspective stressing that school communities are not apolitical, and that decision-making should consider both the risks and the potential rewards of innovative practice.

Some ideas that may support moving towards a more innovative approach to gaming include:

- Assisting educators to build bridges within their school communities through online and face-to-face mechanisms (e.g., wikis that showcase digital games, information sessions) with open discussion of the benefits and risks of digital games.
- Further develop and showcase the evidence-base on successful in-context exemplars of how to best manage digital gaming in schools and how to best harness digital gaming for innovation in schools.
- Negotiate the use of digital games with parents, balancing the demands of the curriculum with providing students with opportunities to use digital games in ways that embrace the principles of life-long learning.

- Development of checklists, evaluation tools and templates to help educators make informed judgments on the educational value of digital games.
- Institute a whole-of-school community approach to appraising digital gaming by inviting parents to become involved in playing and reviewing digital games.
- Implementation of a gradual culture change towards continuous, rather than high-stakes assessment practices.
- Pilot and test the use of computer, laptop and tablet technologies in current high stakes assessments.
- Further research to find a particularly good example of an educational game in one subject and using it as a positive sensitising, that in time could clear the way for broader experimentation with educational games and simulations in other subjects.

Adoption of digital games in education requires careful consideration and planning. There are still pedagogical challenges facing teachers in terms of using digital games to stimulate higher order cognitive processes, better managing ICT rich classrooms, and minimising distractions from gaming. A crowded curriculum and high-stakes assessment processes are also somewhat inconsistent with the promise that digital games bring to generating new forms of learning that focus on problem solving, exploration, investigation and creative work, and that ultimately support life-long learning (Bate et al., 2014). Therefore, there is a need to broaden the argument from gaming to creative teacher-led educational uses of ICT.

The management of students within a 1:1 classroom is difficult and there is no single approach that fixed this issue. Students at some stage were fascinated with gaming and found themselves at times being distracted or tempted by the seductive power of technology. The adoption of digital gaming for learning requires a level of scrutiny that takes into consideration the risks and affordances for teaching and learning. Although, innovative approaches to learning through the use of ICT have the potential to engage students, adopting untried approaches in a crowded curriculum was perceived to be risky. A regulated environment where active teaching and task creation, buy-in from students and the community, and deterrents put in place, all played an integral part in the effective management of distractions in the 1:1 laptop environment.

8.7 Paradox Three: Hopes and Fears of Web 2.0

Web 2.0 technologies assist interactive information sharing and collaboration through the Web, where users can interact and edit information, and are popular with young people (Lenhart & Madden, 2005). Given the mass adoption of Web 2.0 by young people there is debate in educational circles about how the use of these technologies might be used in schools (Selwyn, Potter, & Cranmer, 2010). Opportunities for teachers to use Web 2.0 to embrace constructivist approaches through social interaction to construct knowledge could be viewed as a benefit, however, the risks (e.g., off-task behaviour, distraction, subject area relevance) of whether this approach assists learners may outweigh the benefits. Luckin et al. (2009, p. 102) believe, “it is not down to teachers alone, parents, institutions and policy-makers also have a role to play – in supporting teachers to take that risk.”

8.7.1 Boosting collaboration, cooperation and communication

Teachers and students both reported a decrease in collaboration and cooperation in classes. There appeared to be a shift towards increased student independence since the implementation of the 1:1 laptop program. According to Schulz-Zander, Büchter, and Dalmer (2002) ICT embedded in a school learning culture providing opportunities for students to cooperate and collaborate has the potential to stimulate the necessary change in schools so that they can better meet the demands of the knowledge society, particularly the ability to work effectively as part of a team. Yet, at the School, teachers rarely used laptops to improve collaboration or cooperation (discussed in section 4.3.4 and 4.7.4 respectively), perhaps due to a crowded curriculum, assessment schedules or simply not having adequate time or skills to use laptops. Web 2.0 technologies are a method for teachers to boost the collaboration, cooperation and communication. Applications such as SlideShare, Prezi and Picsviewr are examples of presentation applications that enable students and teachers to create presentations and then share them online.

Using applications designed for collaboration could be useful for teachers and assist them with signature pedagogical approaches with the help of Web 2.0. The following applications seen in Figure 8.4 are a range of commonly used Web 2.0 technologies aimed at increasing collaboration and teamwork skills. These examples are just a small snapshot of what is available and are rapidly becoming tools of choice for an increasing number of classrooms (Crane, 2012).

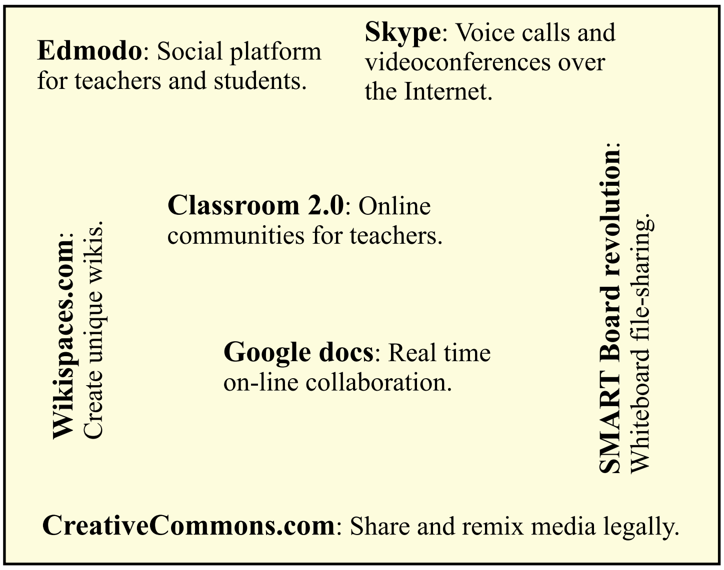


Figure 8.4. **Examples of frequently used Web 2.0 technologies aimed at increasing technology.**

Teachers at the School used Web 2.0 technologies minimally although as uncovered in the teacher findings chapter (Chapter Four), they had a basic understanding of the use of Web 2.0. The School had not made a blanket rule to ban the use of all Web 2.0 tools, except for Facebook. Teachers seemed reluctant to experiment because of the unknown capacity of how these tools could help teaching and learning; they were too busy, focused on the structured curriculum; and there appeared to be a fear factor of taking a leap of faith to use Web 2.0 tools for learning. The following excerpt is an example of this:

> To tell you the truth I really don't have a good grasp of Web 2.0 tools. I hear they are good, and I would like to use them, but at the same time I have some apprehension of

> whether they will work in my mathematics classes. I would need to be shown how they could work to be convinced for using them in my classes. (C542012)

Some teachers may regard themselves as the experts and do not want too much communication and therefore the risks of using Web 2.0 may be far greater than the benefits. It could be that deep down some teachers at the School are not particularly oriented towards social constructivism. Certainly there was no implicit block put in place by the School to prevent teachers from using Web 2.0 technologies. Another possible reason as to why teachers did not use these tools for learning was because of the structured curriculum and standardised assessment constraints. Teachers were time-poor and needed support in determining what Web 2.0 technologies would work for them. These views are similar to the research of Kale and Goh (2014), who identified these types of sentiments in the attitudes of 167 K-12 teachers when using Web 2.0 technologies in their teaching. Ultimately it would appear that it depends on individual staff who are willing to experiment with Web 2.0, which in turn may reduce the barriers that exist when it comes to harnessing Web 2.0 technologies for learning. The School may well need to look at targeted professional learning, workloads, and the opportunity for staff to access time to practise with Web 2.0 technologies depending on their subject area.

8.7.2 Targeted professional learning

The research found that teachers required professional learning in collaboration, cooperation, communication and differentiation of learning. As Brown (2006) reported, the value of ICT professional learning is obvious. Perrotta (2013) suggested teachers need technical and pedagogical support when using ICT. Therefore, professional learning needs to be targeted and as Bebell and O'Dwyer (2010) found, it is vital for the success of any 1:1 laptop implementation. The quantitative data in Chapter Four showed the limited use of laptops for collaboration and cooperation. Herrington and Parker (2013) highlighted the potential for using emerging technologies for learning, providing opportunities for communication, collaboration and a platform for creation. Professional learning opportunities tailored to the use of ICT may provide opportunities for teachers to consider using laptops for communication and collaboration. As a starting point, teachers may require support with emerging technologies; for example, the use of Web 2.0 applications. Such applications could be used as another medium to connect with the current generation of students, as their personal use of mobile technologies continues to rise (Edmond, Thorpe, & Conole, 2012).

The potential for using ICT to scaffold higher order thinking and for differentiation were other possible professional learning opportunities shown in the study. Santangelo and Tomlinson (2012) proposed that if teachers are to teach effectively in a diverse student environment, then they need to differentiate proactively in their classrooms. Differentiated learning for students has been shown to facilitate higher levels of achievement (Hallinan & Kubitschek, 1999).

Overall, Web 2.0 can provide opportunities for teachers to embrace constructivist approaches for teaching and learning. However, there is no single solution for schools when searching for an answer to the question of whether Web 2.0 is worthwhile. Teachers taking pedagogical risks in using Web 2.0 technologies may well need support from the wider school community if Web 2.0 is to be embraced to promote alternative approaches to collaboration, cooperation, and differentiation. Finally, targeted professional learning in these areas might well serve as a catalyst for teachers to build confidence and take a ‘leap of faith’ into applying Web 2.0 to their pedagogical challenges.

8.8 Paradox Four: Transformative and Conservative Pedagogical Practices

The study revealed students, teachers and parents held positive perceptions about the effect of motivation and engagement towards learning since the implementation of the laptop program. These perceptions are in line with previous research as discussed in the literature review, indicating laptops help to motivate and engage students in learning (Bebell & Kay, 2010; Keengwe et al., 2012; Suhr et al., 2010). Teacher participants at the School had limited involvement in the planning and administration of the 1:1 laptop program, chiefly instituted by the school leadership team. As with other ICT implementations, teachers were challenged to adapt their way of teaching with the onset of the 1:1 laptop program (Kervin & Mantei, 2010). Developing effective teaching strategies emerged as a key issue over the study. Despite the varying views of some teacher participants who questioned the effectiveness of the 1:1 laptop program, when all 27 teacher participants in the final year of the study were asked, “Would you keep the laptop program?” all indicated they would retain it. The following excerpt is an example of this:

> I would certainly keep it, I think the fact that ICT and computers in some way, shape or form a big part of students’ and adults’ workplace. Whether it be university studies or through their workplace training that they’ve got to learn to be able to live in a life with ICT, and use it well and manage all the other things in their life in the same sort of way. Do we put restrictions on their usage or something like that? I don’t know, but finding the best model will be an interesting one in the coming years. But I certainly think that it needs to be there because we are teaching the kids the right sort of skills that they need for life. (C522012)

However, findings from observations showed the use of laptops, was varied in use and output. On the one hand, teacher participants were advocating sustainability of the laptop program; however, when observing lessons there were inconsistencies in the level of use of laptops for teaching and learning. These inconsistencies suggest that teachers knew it was the right thing to do; they just did not know how to best go about it.

8.8.1 Balanced approach to teaching

The classroom dynamics had evolved since the introduction of the 1:1 laptop program. Classrooms at the School transformed from limited computer access (e.g., five to six computers in most rooms and computing laboratories) to an environment where each student had their own laptop. The role of the teacher also changed with teachers taking on a more facilitative rather than teacher centred role. It also became apparent that keeping a balance between ICT-rich and non-ICT activities rendered better results. Teachers who did not over-rely on laptops were themselves more satisfied and in turn were able to develop more vibrant teaching and learning settings. The research findings did not support the abandonment of the laptops; rather participants favoured a balanced approach.

One of the aims of the implementation was to provide opportunities for both students and teachers to have greater access to ICT and adopt a 21st century digital approach to teaching and learning. However, one recurring theme to emerge from parents, teachers and students was a call to maintain the balance:

> You have got to have a balance really; you cannot be on your laptop all the time, even if it is learning all the time. You have to do a mix of things. (A052010)

> Keeping the balance is important. I think some jobs would call for a laptop, but other ones rely on pen and paper approaches. (B232012)

> Very careful of keeping the balance, and I guess the reason for that is, I guess, because I have been teaching for so long without even having to use a laptop, so for me it is all about trying to find that balance. We use it in all subjects and for a variety of reasons. (C672012)

> It's all about balance, so it's not necessarily a bad thing. It's just if one thing overtakes another, I think it's a problem. (Parent Forum Year Three Cohort A and Cohort B)

In discerning what was meant by a 'balanced approach' the research considered the levels of use of ICT by teachers and students; the overuse of ICT not aligned with educational goals; the alignment of ICT use with educational objectives; and broad uses of ICT. All of these considerations helped in framing an understanding of the term 'balanced approach'.

Bruce and Levin (2001, p. 2) reported the balance between learning and doing has been impacted by new technologies for learning. Furthermore, they are of the view that there is a "need for a balance between learning and doing, in which the costs of learning are outweighed by the benefits of learning." Ultimately, the School and the parents were interested in an implementation approach where the use of laptops would not compromise the students' learning.

The study revealed how teachers facilitated laptop use varied from subject to subject at the School adding further to the dimension of a balanced approach. In some instances laptops were being used for a large proportion of the day where in other cases laptops were not being used at all. This variability contributed to a disparity of how students were using laptops for learning. In some classes, laptops were embraced whereas in others they were used minimally or in some instances not at all. The School reacted by employing an ICT facilitator to support teachers in developing strategies of how to use laptops for learning. This appointment provided optimism for the School in having a skilled educator on the ground to attend to the needs of teachers in a 1:1 environment. The initiative highlighted the importance of uniting teachers in a common vision with the aim of reducing the gap between subjects, the pursuit of continuous improvement and the provision of pedagogical support. This approach was central to improving teachers' technological pedagogical knowledge (Mishra & Koehler, 2006) through the use of ICT.

The provision of the laptop, a powerful tool for learning, shifted the teacher capacity to move from a didactic form of delivery to that of a facilitator-type role. Shifting to more student-centred approaches, enabled teachers to provide learning experiences that were both motivating and engaging:

> I think generally overall I just find the boys are more motivated, it is more engaging for the students to learn. The biggest thing, I think, is for us teachers to learn how to optimise the use of the laptops in the classroom. (C692011)

The shift to a more facilitative pedagogical approach required teachers to think about how they could use the 1:1 laptop environment to optimise learning for each individual student. The following excerpt provides an example of how laptops were used for differentiation:

> In terms of differentiation it helps if the kids are away from what I am doing so I am there facilitating and helping with problems, but not just moving the lesson forward and being the sole sort of focal point of the room. It means that the kids can work at their own pace and focus on challenging themselves and extending themselves. Laptops are integral to doing that because if you use something like MyMaths Online it has support built-in there and then anything that they still do not get they have got me to float around the room to help them, and also their peers that can help them as well. (C652012)

With the increased reported independence of the student participants, laptop use requires students to have greater self-regulation. This attribute of the model for understanding how policy intersects with reality (as seen in Figure 8.1) highlights the potential for students to become reflective and life-long learners. However, this level of differentiation was not typical across learning areas.

The study reinforced the need for the School to spend more time and money on the development of comprehensive, differentiated learning experiences rather than focusing on operational issues such as purchasing and supporting the device itself. These operational issues are necessary; however, they should not be the main focus of a 1:1 program. A level of rigour is required at the start of the process to determine how mobile devices can be best integrated into the teaching and learning program of schools (Weston & Bain, 2010).

Finally, by understanding the fundamental traits for effective teaching, the classroom learning experience could meet the demands of student requirements when immersed in a 1:1 learning environment. Teachers who continue to adopt the ‘sage on the stage' approach, run the risk of compromising the learning within their class or the level of success of a 1:1 program (Groff & Mouza, 2008). Teacher effectiveness is a key component underpinning the success for learning (Hewitt, 2008; Kochtanek & Hein, 2000). Hattie's (2009) research onto effect sizes indicates that teachers have the potential to have the greatest influence over student performance. Therefore, it is necessary to understand how the 21st century student learns and what type of learning environment addresses their needs (Lemley et al., 2014; Prensky, 2001). A laptop is a powerful tool that needs a purpose within the classroom. Without this purpose, what happens in the classroom or what happens to learning can be compromised. As demonstrated in the School, a 1:1 laptop program can impact negatively when students are distracted by all the seductive qualities of games or social networking that negate an effective learning environment as discussed in 8.5.1. Managing these distractions is an ongoing challenge for 1:1 schools.

Observations over the period of the research confirmed a steady improvement in the way teachers used ICT. However, over the course of the study when comparing the views of teachers and students there was substantial variability in the way in which laptops were perceived as being used for teaching and learning. Students emphasised that for learning to be meaningful when using laptops, teachers needed to take into consideration a range of strategies. Students stressed the importance for teachers to remain mobile when delivering lessons as this minimised the chances of students being distracted in the learning environment. Classroom organisation as discussed by Lyons, Ford and Arthur-Kelly (2011) is necessary for the enhancement of classroom management. Furniture arrangement and the structuring of groups was important from both a classroom management and a learning perspective. Rows of desks might not be the most suitable approach when using laptops for learning. A teacher's presence by simply walking around a classroom can contribute to the focus of a student when using a laptop, reducing off-task behaviours.

Engagement is key between teacher and student as it allows for interaction and conversation to enhance the learning experience. There is also a need for the classroom to have a strong sense of management and discipline. Sprick (2013) supported these sentiments and stressed the importance of having defined and clearly consistent behavioural expectations for class activities. This view also resonated with student participants from both cohorts.

Some teachers were reluctant to embrace laptop use because the ultimate assessment tool (final examinations) was a pen and paper exercise. Not having an overreliance on the laptops was a view shared not only by teachers, but also parents. Similar to other studies (Giordano, 2008; Voogt, Almekinders, van der Akker, & Moonen, 2005) that promote targeted workplace-based professional development, the teacher participants shared the view that professional development had been adequate and transferable to their teaching. What did arise from the study and consistent with the research of Cowie et al. (2011) was the recognition of a designed and targeted approach to regular professional development. Targeting teacher use of laptops for teaching and learning in a variety of areas such as collaboration and differentiation could help focus professional learning programs when using laptops for teaching and learning.

Teachers reported that since the introduction of the 1:1 laptop program, there had been noticeable impacts on the teaching and learning dynamics within the classroom for operating and inquiring with ICT. This finding connects with the research of Garthwait and Weller (2005) who found that with the implementation of a higher ratio of computers to students there may be a change to classroom teaching and learning dynamics in classrooms. When explaining the dynamics of teaching and learning with laptops, the shift from a pen and paper environment to each student having a laptop on their desk could be viewed as confronting for teachers who have yet to experience such change.

Given that teachers have taught a particular way, the introduction of the laptops suddenly changes a classroom environment. Instead of focusing on how to deliver a particular lesson, teachers found themselves having to learn how to facilitate using laptops. In the observations that were conducted in the early phases of the introduction in Year One of the study, there was evidence of a wide variability of how teaching using 1:1 laptops was being conducted in each classroom. Some teachers demonstrated a willingness to use laptops and at the same time consider aspects such as table and seating arrangements of their classes. This willingness was in stark comparison to some teachers who conducted lessons in the manner they had previously directed them without laptops. The variability provided students with opportunities to push the boundaries from teacher to teacher in terms of how they behaved, and the extent to which they were engaged or distracted. Students discerned when they could access content, or use the laptop for other activities that were not related to learning. For some teachers, this caught them off guard, or they were simply not prepared for what could occur without careful laptop management. In a classroom prior to laptops, a quiet class of students could be perceived by the teacher as possibly being on-task and learning. However, in a 1:1 laptop classroom this quiet atmosphere was not what it seemed, with students engaging in off-task behaviours; placing teachers in a position of having to rethink their individual approach to teaching and learning with laptops.

8.8.2 Effective teaching strategies

Results from the 1:1 laptop program indicated an improvement of the level of teacher ICT competency, confidence, and their view of positive impacts of laptops in the classroom. These attitudes are consistent with the study conducted by Falba, Grove, Anderson and Putney (2001). Teachers, by the completion of the research, had moved away from the often onerous tasks of typing up information or simply completing drill and practice activities as described by Chalkley and Nicholas (1997). Teacher willingness to adapt to the 1:1 implementation promoted a shift in the types of lessons that occurred. An example of this was the use of the Australian Stock Exchange (ASX) stock market game that was used as a self-paced tool in a relatively unsupported manner (e.g., there were limited formal opportunities for reflection on decision-making). The game itself helped students to build research and strategic decision-making skills and develop an understanding of relationships between disciplines (e.g., economics and politics). Similar to the research of Orlando (2013) into teacher use of ICT, these shifts reveal teachers were not resistant to change. The change might be perceived as slow if one could expect teacher use of ICT to be at a higher level than the discussed or observed examples. However, is it realistic to expect major shifts in the adoption of laptops for learning in a short time-frame? Three years could be viewed as a snapshot in shifting teachers' pedagogical beliefs (Bate, 2010a), and subsequently their capacity to use laptops for student-centred learning.

Since 1998, with the introduction of the search engine Google, a generation of students have been able to quantify statements or questions by accessing Google instantaneously through the use of their laptop (Schuster, 2010). Previously this would have been an iterative process between the teacher and the student, or a student using the library or other sources to access information to respond to a question of interest. This is no longer the case. In general, the research found that the students were able to help resolve problems and support each other without the teachers necessarily providing all the answers. Inadvertently, teachers found themselves redefining their roles in the 1:1 laptop environment and transitioning into a facilitating role; for example:

> It is mainly facilitating and guiding what they are doing and how they are doing it. I find that they are a lot more independent and once given a task they come up with their own ideas of how they might do that using their laptops. Whereas, perhaps in the past it would be more teacher driven, and you would have to sort of maybe give more outlines. (C372012)

This perception from teachers that this role is fundamentally altered by the 1:1 laptop implementation is consistent with previous research (Pearson & Naylor, 2006). The current research found that the facilitator role adapted by teachers enabled students to access massive amounts of information and use this for learning. Teacher Participant 31 who had been teaching for five years, predominately in middle school mathematics expressed the changing role of teaching and demonstration of this shift in an excerpt from Year Three of the study:

> A: Now you cannot fool a kid, you know, if you tell a kid something – ‘Are you sure, Sir, are you sure? Let me Google it.’ You know, maybe they have read it somewhere, maybe they have heard of it somewhere.
>
> Q: But they have got the tool to check up on you?
>
> A: They will check up on you, and they will check – ‘But Sir, I found here, it says this, ...’ You go, ‘Oh, that is true,’ and you get caught out so you have to be very careful. Now they know how to search. I think they are a lot smarter nowadays; they want to know exactly the truth, you know, and they search for it. Is this guy really the richest, you know, whatever, the fastest – they will research it. I think that is the beauty of it, it’s really good.

Toshalis and Nakkula (2012) found an approach with students involved in learning activities that support academic challenge significantly increases the capacity for learner engagement and academic achievement. However, Carini, Kuh, and Klein’s (2006) research into student engagement and learning showed that the learning outcomes emanate from a range of sources, of which learner engagement is one. Improving teaching and learning is essential when using ICT, and both learner engagement and facilitating academic achievement are integral to developing teacher competencies when teaching in a 1:1 laptop school.

As stated in the OECD (2009b) report, the traditional model of education, through which teachers communicate factual knowledge to students by lesson delivery and the use of textbooks remains the predominant style of teaching across much of the world. With the ability for students in 1:1 laptop schools to access content via search engines, teachers at the School were cognizant their roles as teachers had changed. For example:

> I think for me it is trying to keep up-to-date with the technology because the students are so quick in getting the technology. I also think it is important that I ask them what they are learning because I've found that I've learnt a lot from them and I learn a lot every day almost with something new from them. So I think one of my roles is to make sure I keep up-to-date. (C342012)

Facilitation of learning was key as the breadth and depth of knowledge available for students was vastly increased with the ubiquitous nature of laptops and the accessibility of the Web. Students' ability to access information and apply newly acquired knowledge to learning was evident suggesting the significant potential of 1:1 laptop programs for learning. Teachers were confronted with a shift in learning for themselves as greater student access to information required teachers to be aware of the constant advances made through ICT and the inadvertent pressures of being continually informed.

A collaborative approach between the students, teachers, parents and the school is vitally important for the attainment of common goals (Epstein, 2001). Effective 1:1 laptop programs require a systematic, balanced approach where there is a linkage between all of the participants. The focus of participants' feedback initially about the 1:1 laptop program, was on off-task behaviour. Over time this changed, with the School responding to concerns such as distractions, school monitoring and educating parents how to manage the device.

The following principles could assist teachers in 1:1 laptop classrooms as the existing model of education continues to evolve:

- student autonomy of their learning, capability to apply and transfer knowledge and the capacity to use ICT creatively;
- active and mobile communicating teacher;
- collaborative experiences during lessons; and
- clear boundaries with an expectation on students to produce concrete outcomes.

For students to maximise their learning of 21st century skills, there is a real need for targeted forms of teaching and learning approaches, that Shulman (2005) referred to as signature pedagogies. Utilising strategies and methods that may suit certain subjects better than others, may become significant for improving the chances of imparting a body of knowledge and assist teachers' integration of technology (Harris et al., 2009). Similarly, Webb and Cox (2004, p. 235) discussed pedagogical reasoning as being at the core of ICT use for teaching and learning:

> ICT-based learning environments require teachers to undertake more complex pedagogical reasoning than before in their planning and teaching that incorporates knowledge of specific affordances and how these relate to their subject-based teaching objectives as well as the knowledge that they have always needed to plan for their students' learning.

A clear message that is fundamental to the success of 1:1 initiatives is a focus on evaluation and the opportunity for feedback. Student participants articulated a strong sense of understanding in their view of effective teacher characteristics in the 1:1 laptop environment at the School. Teachers need to be aware of their students' views and find ways to connect and provide valuable experiences promoting effective teaching and learning (Schleicher, 2012). Therefore, effective teaching strategies equate to sound classroom organisation and management, plus a move from directive teaching to facilitation, linking to contemporary learning theory where learning is active, constructive, authentic and self-regulatory (Jonassen, 2008).

8.9 Paradox Five: Alienation and Integration of Parents

The findings revealed that parent perceptions of the laptop program were at odds with the student participants. There was scepticism among parents about the effectiveness of the laptop program and the concern of the potential dangers of using ICT too much for learning. Consequently, some parents were antagonistic towards the use of ICT. This perception revealed a deeper issue, with some parents reporting being alienated since the introduction of the 1:1 laptop program.

8.9.1 Parent alienation in a 1:1 laptop school

One of the recurrent themes to emerge from the research was a sense of alienation, that some parents felt, as a result of the 1:1 laptop implementation. This alienation was particularly prevalent in Cohort B. The study found that when the screen comes up, it sometimes forms a barrier between student and parent with loss of eye contact as the student becomes more engrossed in digital content. Communication suffers and often parents are simply excluded from the student's learning if any is happening at all. One way to address alienation is to become involved. Parents who find themselves in this position may require some ICT knowledge and an injection of confidence to adopt a more assertive position. Making the curriculum readily available through the School portal was an effective initiative implemented by the School. The analytics were proof of this, with a total of 1,795,551 page views in Year Three of the study. This figure alone, would suggest the implementation of the portal was a significant step in improving the link between School and home. Further to this, through the introduction of an ICT facilitator, School parent information sessions took place to ensure parents understood the use of laptops for learning. These proved to be useful at the School in educating parents about themes such as setting up the home ICT environment to involve screen sharing to make students' work more transparent.

Ortiz, Green, & HeeJeong (2011) suggested a link in the way parents perceive ICT and the influence that it has on their own son's learning. If the parent held a favourable perception about the laptop as a tool, then there was the possibility that their son would have a similar view. Also, as discussed in section 6.2.2 of Chapter Six, the data found that parents with lower than average ICT knowledge and skills had a greater level of uncertainty with the 1:1 laptop program. This finding calls for further inquiry.

Even though parents perceive that they know what schools are about as they were once students (McDonald, 2010), these views were not always aligned to the changes in learning since the onset of the 1:1 laptop program. For most parents, an important gauge of how their son is performing is the subject grades achieved over the course of the year. For some parents, it was their view that the laptop program had negatively impacted on their son's progress or achievement due to the associated distractions and loss of control in their homes.

The views of parents changed over the period of the study and also differed between the junior and middle school experience. Parent perceptions of excessive and frivolous time that their children spent on the laptop were more prevalent in the middle school than the junior school. If these perceptions are accurate, then this appears somewhat at odds with the proposition that children become better learners as they grow older (Maldonado-Carreno & Votruba-Drzal, 2011). The situation is clearly more complex as students move into teenage years where they become increasingly faced with dilemmas over which objectives to pursue. For example, cognitive and academic goals may compete with tendencies to seek belonging, build self-esteem and gain the respect of others (Schweinle, Turner, & Meyer, 2009). Mastery of digital technologies (particularly gaming) may be a passport to popularity. Other contextual factors also come into play as students enter middle school. For the first time, they have subject-specialist teachers and are expected to move between learning spaces responding to different teaching and classroom management approaches. It is understandable that less independent students are seduced by trivial uses of ICT in this new environment in contrast with the stability of a primary school setting, typically characterised by strong and respectful student-teacher relationships. There may be a need for special support in the first year of middle school when implementing a 1:1 laptop program as this is a particularly challenging time. This consideration could be a fruitful avenue for further research as discussed in Bate et al. (2012b).

The differences between student and parent perceptions of changes in learning since the introduction of the laptop program were fractured. Students from both cohorts perceived greater shifts in their learning than their parents. It is possible that the parent perceptions of frivolous and excessive use of the laptops and parent detachment or alienation may have negatively influenced their impressions of the overall learning taking place. Much has been written about parents as partners with schools and the impact they have on the raising and educating of their children (Khong & Ng, 2005; Oostdam & Hooge, 2013; Springate & Stegelin, 1999; Vincent, 2000). As parents struggled with the introduction of the laptop program and the adoption of new methods of teaching and learning, they were unable initially to connect with the new learning environment.

8.9.2 Parent integration

The research suggests that for alienation of parents to diminish, effective communication between all participants should occur. Student communication of learning with their parents is complex. As parents may be seeking greater insights into what may be occurring at school, students may not often provide the level of insight that parents seek. Junior school parents (Cohort A) at the School appeared to be more involved in their son’s education, and this was evident through the parent forum feedback about the junior school implementation. Even though views of parents were varied, with some parents having issues with the laptop program and others not, there was certainly a difference between the junior and middle school implementation experiences. Parents who had a son in the middle school had less involvement in comparison to parents from the junior school setting. Parents in Cohort B may have felt this way because they suspected they could no longer assist their son due to the challenging nature of education as reported by Hill and Tyson’s (2009) research in determining whether and which types of parental involvement are related to achievement. Lam and Ducreux (2013) reported the level of parental involvement continues to decrease as students track through school. Therefore, the risk of alienation could be seen to escalate, continuing to widen the information gap between students, teachers, parents and schools. As one teacher commented:

> I would like to see the parents be involved not only on the ICT side of things but all aspects of their work and homework and so forth. (C712011)

Schools in the 21st century seek to ensure learning is accessible for not just students and teachers, but also parents. The provision of active school portals with updated information can assist in removing the barriers to effective communication some parents experience with this technologically-minded generation.

Mobile learning provides opportunities for constructivist approaches to teaching and learning which engage students collaboratively in knowledge construction. Most teachers in the study acknowledged the links between using ICT and more student centred pedagogies. However, paradoxically, since a large portion of student work is digitally created, parents now have less knowledge of what is taking place for their children.

> I think a lot of parents don't see the good things that their child is doing on the laptops. (C682011)

By "good things" this teacher participant was most probably referring to digital resources the students were able to access or use on a daily basis in a classroom. Ultimately the ability to access a wide range of information for subject specific purposes was often mentioned by teachers as helping student learning.

If parent support for their child's learning is a critical factor in successful learning, then minimising this sense of alienation should be built into the planning of mobile learning initiatives. Strategies could include screen sharing both at school and home and also regular parent information and/or skills sessions using laptops. Epstein (2008) reported that with family involvement, students can improve in subjects such as English and Mathematics, set higher goals, come prepared for class and tend to have fewer behavioural problems.

8.10 Summary

The study identified five paradoxes that were a useful focus in which to conceptualise change. These are:

- autonomy and systemic dependency of school;
- engagement and seduction of students;
- hopes and fears of Web 2.0;
- transformative and conservative pedagogical practices; and
- integration and alienation of parents.

With each of these paradoxes, this chapter has proposed a set of ideas and suggestions, developed through the experiences encountered at the School. Ultimately these can be summarised as follows. The study found that excellent 1:1 implementation is founded on exemplary teaching and learning characterised by differentiated learning; enhanced facilitation skills; a balanced approach to teaching and learning; an ability to manage distraction; and school community involvement. Some opportunities to improve the teaching and learning environment in boys' education could be explored through greater use of 1:1 devices as collaborative tools, and appropriate use of educational games and simulations.

In order to build a strong community consensus, the School needs to capture academic and incidental learning outcomes not traditionally captured in high-stakes assessment processes. Some ideas for alternative methods of capturing outcomes include embracing 21st century learning principles and shifting the emphasis from standardised testing. There were some significant differences between junior and middle school 1:1 implementations. The differences suggest that introducing a 1:1 program earlier (e.g., in junior school) will yield better results than introducing it later in boys' education (e.g., middle school) when students are confronted with greater pressures and temptations. The final chapter of the thesis will conclude the study and suggest some ideas for further research.

CHAPTER 9. Conclusion

9.1 Chapter Overview

The final chapter completes the study by summarising the key findings and implications within the context of the study's five research questions. The chapter also offers suggestions for further research.

9.2 Implications of the Findings of the Research

The above findings demonstrate the perspectives from all sets of participants about laptop use for teaching and learning. Initially, there were concerns about how laptops were being used for learning and the types of distractive behaviours that occurred. These concerns pre-empted the School to implement a suite of changes to enhance the potential of laptop use in classrooms. Some of these included:

- the enhanced parental control software;
- the introduction of e-Safe key-logging monitoring service;
- redesigning the Acceptable Use Framework of the school;
- employing a key ICT teacher to assist staff and students in classes;
- the introduction of a school portal for all stakeholders to use; and
- professional learning for teachers on laptop use for learning.

There were some differences in opinion in views between what students, teachers and parents perceived as a successful 1:1 laptop program. On the one hand, students were excited and motivated about learning whereas on the other teachers and parents were more cautious and at times anxious about the impact of 1:1 devices on learning. Inquisitive students, creative teachers, proactive leaders, and national/state policy directions were the core drivers, which ultimately would provide opportunities for students to become self-regulated and reflective life-long learners. However, five hindrances (previously discussed in Chapter Eight) linked to the 1:1 laptop program had a significant impact on the 1:1 laptop implementation. Three key themes emerged from the study which could act as a catalyst for positive change in other settings: developing a culture for 1:1 laptop use in a school; re-defining teaching and learning outcomes in a 1:1 school; and, balancing the use of ICT.

9.2.1 Developing a culture for 1:1 laptop use in schools

A crucial stage in the implementation of a 1:1 device school is the formation of a well-founded understanding of what a 1:1 laptop program aims to achieve. Carefully considering the introduction of 1:1 initiatives in the first place may well foster an approach of transparency and understanding for all involved. Some ways in which schools can develop an outline for laptop use in schools could include:

- Providing teachers with specific teaching and learning strategies (e.g., differentiation, higher order thinking skills) targeting the use of laptops for learning.
- Supporting student use of laptops for learning in terms of ethical use, investigating, creating, communicating and managing and operating ICT.
- Engaging parents in the communication of 1:1 laptop programs with regular updates and examples of how to support their sons with the use of ICT.
- Becoming familiar with methods of addressing and managing distractions in a 1:1 classroom.
- Ensure schools implement safe networks that protect staff and students from inappropriate use of ICT with a range of strategies that include monitoring Internet use.
- With boys having a fascination with gaming, teachers need to be aware of these temptations and be active within classrooms. Similarly, teachers should consider the potential of gaming for learning.
- Encourage teachers to experiment with Web 2.0 technologies for collaboration, cooperation and communication purposes when using laptops, embracing constructivist approaches to learning.

- A pedagogical focus on core areas such as the differentiation of curriculum, where each student's learning is tailored.

- Increasing the opportunities for students to collaborate and cooperate with each other, external communities, organisations or other schools.

- Encouraging students to take responsibility for their education with a focus of using mobile devices ethically.

- The promotion of good study habits incorporating 21st Century learning.

- Developing a school improvement plan focussed on improving academic outcomes.

These ideas could promote opportunities for an iterative dialogue with the stakeholders within a school and furthermore design a planned and targeted course of action that is transparent and supportive of teaching, learning and change as has been found by Caputo and Rastelli (2014). As was the case at the School, some teachers and parents were unsure about the 1:1 laptop program and were concerned about the impact on academic achievement and the intrusion of mobile devices in their classrooms and homes. However, through active communication and direction of school leadership teams, such guidance helped to reduce concerns and inform these groups about learning with 1:1 mobile devices. The School uncovered a range of emotions and parent and teacher views; though, these settled due to both the reactive and proactive initiatives used by the School. Introducing monitoring software to empower the School with knowledge of student laptop behaviour was key in underpinning a cultural change in how laptops were used for learning. These analytical data provided key snapshots of what sites students were accessing during school time. Secondly, the School invested both financially and in human resources in the creation of the position of an ICT facilitator to assist teachers, and at the same time working with students and parents. Providing parent sessions about setting up parental controls and educating parents on what to expect in using laptops for learning, were also changes made to engage parents further. These sessions helped to reduce the level of alienation of parents, one of the five hindrances identified in Chapter Eight.

9.2.2 Teaching and learning outcomes in 1:1 laptop schools

The study found that teachers were still predominantly administering high stakes summative examinations via pen and paper. Laptops were mainly used for formative assessment purposes with the focus being on assignments and continuous assessment. Furthermore, measuring the value or outcomes of ICT competencies of students, were not a high priority for teachers and parents.

Using NAPLAN as an indicator to monitor longitudinal performance in literacy and numeracy outcomes offers valuable insights into both cohorts. Comparing and contrasting previous cohorts facilitated comparisons, and collectively these comparisons served as one indicator. However, applying a wide-ranging approach where schools employ a variety of performance measures over time is needed. Some of these measures might include:

- assessing 21st century skills for student learning;
- measuring ICT competencies in context through the immersion of activities or assessments with a focus on creativity;
- monitoring the progress of 1:1 programs with ongoing school-wide evaluation of the provision of educational experiences for students using 1:1 devices; and
- promoting the active involvement of students, teachers and parents in the ongoing formative improvement of 1:1 programs with a focus on access to learning and sharing of information.

Applying these measures may be of benefit in developing a more refined approach to measuring outcomes in 1:1 schools using mobile devices for learning. Teachers in the study were placed in a challenging position of supporting a 1:1 laptop program, yet having to conform to the demands of high stakes testing such as NAPLAN and set curriculum outcomes. Laptops provide teachers and students access to a wide range of information and tools to supplement learning and enhancing creativity, however they also have the potential to distract students and tempt students away from the core requirements of the curriculum. Teachers face a difficult challenge in balancing the use of ICT for learning within these constraints.

9.2.3 The balance of using ICT

Most student participants viewed the 1:1 laptop program a success and thought it was an essential part of learning both at home and school. Teacher participants expressed concerns about the potential distractions and temptations for students to be off-task (Bate et al., 2012b). However, these teachers also believed with the right balance that laptops were an integral part of teaching and learning.

Initially, the study uncovered the potential for students in a 1:1 laptop program to be seduced by the device and lose academic focus. However, over time, and as particularly observed in Cohort B, there was an intrinsic maturation and greater self-regulation of their own learning. Student participants from this older age cohort became reflective of the pressures involved in the upper year levels of middle school and the related learning area requirements that became more important over time. This shift away from the distractions of the Web and the seductive nature of ICT further emphasises the ability of mobile devices to be part of the teaching and learning solution rather than be framed as the ‘problem’.

Finally, the study has shown, that for students to be self-regulated learners, schools have a duty to monitor and provide students with feedback about expectations and importantly provide them with real world experiences. Sidelining these issues is not congruent with the 21st century approach to learning, where students are empowered with autonomy to make choices about their learning and actively apply their knowledge and capacity to use ICT innovatively (Beetham & Sharpe, 2013). Students from the study demonstrated a higher motivation and engagement towards learning when using a laptop for learning. Therefore, the arguments for 1:1 programs are compelling, certainly in terms of student satisfaction.

9.3 Suggestions for Future Research

As 1:1 mobile device programs continue to grow in schools, the focus on the use of these tools for teaching and learning in education continues to generate momentum (White, 2013), particularly with increased technology capacity and relatively lower cost. Certainly in European schools, there is an increasing rate of adoption of 1:1 mobile devices for learning (European-Schoolnet, 2013). With this change and a higher saturation of 1:1 programs, dealing with potential effects of such programs continues to be an increasingly topical and relevant issue for schools. Additionally, with the continued diffusion of ICT in schools (Selwyn, 2010), teachers are expected to embrace methods promoting the use of ICT at a higher order of learning (Miller et al., 2008), and exploit the opportunities to communicate, investigate, create, manage and operate, and apply social and ethical practices (ACARA, 2010a).

In terms of the impacts of 1:1 laptop programs, the following four suggestions may be useful for others wishing to make applied and/or theoretical contributions. Firstly, more empirical studies that focus on boys' education in a primary school, compared to middle school settings could provide schools with further evidence of how to make the 'leap of faith' into the use of 1:1 mobile devices for teaching and learning.

Secondly, as Tapscott (2009) articulated, schools are now required to change their approaches to teaching and learning to address the rapid changes taking place with students in the 21st century. Investing time to diversify away from pen and paper traditional examinations may also be of interest as discussed by Newhouse (2013). This research could potentially inform teachers of exemplary teaching and assessment practices and approaches to learning skills.

Thirdly, the role of parents in supporting students in 1:1 laptop or mobile device schools is an area with limited literature. This research could identify effective approaches for parents to support children in 1:1 schools. Specifying the types of approaches of parents who embrace, or are involved in the use of ICT as part of their child's learning may offer some needed insights. This might be a step in demystifying some of the barriers between schools and home and possibly alleviate some of the apprehension around the use of laptops for learning. This research could assist schools in developing parent-school partnerships and by supporting parents with the provision of relevant information about laptop/mobile device use at school. The research and design of such a partnership may potentially decrease the hesitation to use ICT by some teachers and schools. This initiative may also provide valuable information for parents who may not view the use of ICT as important and have a greater emphasis on traditional models of assessment and learning.

Finally, the area of gaming and learning continues to gain momentum within recent current literature and scholarly discussion (Gee, 2012; Klopfer et al., 2012). Macro- and micro-level politics have combined to produce a conservative approach to digital gaming although educational literature would indicate that innovation in this area may be fruitful (Bate et al., 2014). Further research into digital gaming might examine the range of cultural contexts in which digital gaming is introduced, paying particular attention to political and economic motivators that impact on decision-making and which ultimately affect student learning. Identification of key enablers that might encourage teachers to use digital games to innovate in the classroom could also be useful. Adoption of digital games in education requires careful consideration and planning (Chen & Hwang, 2014; Gee, 2005a). There are still pedagogical challenges facing teachers in terms of using digital games to stimulate higher order cognitive processes, better managing ICT rich classrooms, and minimising distractions from gaming. A crowded curriculum and high stakes assessment methods are also somewhat inconsistent with the promise that digital games bring to generating new forms of learning that focus on problem solving, exploration, investigation and creative work, and that ultimately support lifelong learning (Bate et al., 2014).

9.4 Final Comments

Chapter Nine has included a summary of the findings and discussion in relation to the five research questions. The implications of these findings are discussed and suggestions about some possible future research directions are made. The implications of the findings were also compared to previous studies.

The study comprised a cohort of male students from one school, their teachers and parents. Although small in size compared to previous large-scale research into 1:1 laptop program implementations, such as the Maine Learning Technology Initiative (Waters, 2009), the participants provided authentic feedback that endeavoured to be credible and portray an accurate reflection of the context of the study. Theoretical discussion included how laptops were used for teaching and learning with an attempt to take an all-inclusive view of the complexities of using 1:1 laptop programs.

It is argued that a conservative political consensus was reached at the School and that this consensus thrived in an environment of complexity and uncertainty. A disconnect between the rhetoric of preparing students for the digital age (Selwyn, 2011) and the realities of educating students in an environment of accountability was evident, and this disconnect, coupled with rapid ICT change, was a source of ongoing confusion at macro and micro levels. At the macro-level, the understanding of national ICT policy by the School community, including how this relates to other structural features of the education system (e.g., high stakes assessment), shapes decision-making, action (or inaction) and ultimately students' use of ICT. Simultaneously at the micro-level, the experiences that students and teachers have in using ICT, the successes and the failures, combine to form dispositions that become entrenched. The result for the School was a state of uneasy conservatism, which limited positive change.

Research has shown that ICT policy is shaped by broader political and economic conditions (Austin & Hunter, 2013). In Australia, the Digital Education Revolution (DER), launched in 2008, set the agenda for the deployment and use of ICT in schools. Central platforms of the DER were the provision of 1:1 access to computers between Years Nine and Twelve, and the development of educational learning resources through the Learning Federation initiative (now the National Digital Learning Resources Network). The policies implicit in the DER have sent a strong message to schools that digital technologies are synonymous with notions of "progress" and "competitiveness", and indeed engagement with digital technologies are indispensable for contemporary students to function in the new knowledge-based economy. The School embraced these ideas; indeed the DER provided a compelling rationale for the introduction of the 1:1 laptop initiative in the first place.

Finally, 1:1 laptop programs can be a 'doubled-edged sword'. On the one hand, they can provide enhanced opportunities for student-centred learning where access to electronic resources along with communication and creative tools are ubiquitous. On the other hand, they can be antagonistic to the learning process seducing certain types of students to spend time on wasteful and even anti-social activities. Learners possessing a strong work ethic and well-developed organisational skills are more likely to be self-directed and educationally responsible with 1:1 devices. If these students are provided with relevant and challenging curricula, then positive educational outcomes might be expected to emerge from the 1:1 laptop program. A successful 1:1 laptop implementation, therefore, is a partnership between educator and learner (Weston & Bain, 2010), both taking responsibility for the development and maintenance of effective educational learning spaces. Asking students, teachers and parents *how much* and *how* they use their laptops provided much needed insights into some important dilemmas that need to be confronted if educational technologies are to be harnessed for the benefit of future generations.

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APPENDIX A:
Annual Student Questionnaire (Cohort A and Cohort B: First Year to Second Year)

1:1 Laptop program

Please take your time to complete this questionnaire to the best of your ability.

It should take between 15 - 20 minutes of your time. Thank you.

Student questionnaire

1) Please answer the following questions by selecting the response you consider best describes your experience in class.

Think about the work you have to do for school and respond to each statement by selecting one response.

Laptop use for learning	**Often**	**Sometimes**	**Rarely**	**Never**
(a) I do activities to investigate the real world.	( )	( )	( )	( )
(b) I access up-to-date information for my work.	( )	( )	( )	( )
(c) I help decide how to do an activity.	( )	( )	( )	( )
(d) I work at my own pace.	( )	( )	( )	( )
(e) I do group work activities.	( )	( )	( )	( )
(f) I am assessed on the activities I do rather than just tests.	( )	( )	( )	( )
(g) I find the activities challenging.	( )	( )	( )	( )
(h) I am really interested in the activities.	( )	( )	( )	( )
(i) I find and use information about a problem or task.	( )	( )	( )	( )
(j) I analyse information to make decisions in activities.	( )	( )	( )	( )
(k) I create reports on my investigations.	( )	( )	( )	( )
(l) I am given help to learn in the best way for me.	( )	( )	( )	( )
(m) I find it easy to work and learn.	( )	( )	( )	( )

Laptop use at school

2) Think about how you have used your laptop at school over the last year and respond to each statement by selecting one response.

Laptop use for learning	**Often**	**Sometimes**	**Rarely**	**Never**
(a) I have used my laptop to help me learn basic ICT skills.	( )	( )	( )	( )
(b) I have used word processing to produce my work.	( )	( )	( )	( )
(c) I have used graphics to improve my work.	( )	( )	( )	( )
(d) I have used video or audio to improve my work.	( )	( )	( )	( )
(e) I have used spreadsheets to organise and present information.	( )	( )	( )	( )
(f) I have used email to communicate with other students.	( )	( )	( )	( )
(g) I have used email to communicate with my teacher(s).	( )	( )	( )	( )
(h) I have used laptop programs (e.g., Clickview) to find information.	( )	( )	( )	( )
(i) I have used the Internet to find information for my work.	( )	( )	( )	( )
(j) I use my laptop for research.	( )	( )	( )	( )
(k) I use my laptop for creative work.	( )	( )	( )	( )
(l) I use my laptop for communication.	( )	( )	( )	( )
(m) I use my laptop for solving problems.	( )	( )	( )	( )
(n) I have used other functions.	( )	( )	( )	( )

If applicable, please list any other functions:

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____

____

Laptop use at school

3) Think about how you feel about using your laptop at school and respond to each statement by selecting one response.

Feeling towards laptop use	Often	Sometimes	Rarely	Never
(a) I am comfortable using my laptop for class work.	( )	( )	( )	( )
(b) The work I complete using my laptop is important.	( )	( )	( )	( )
(c) The activities using laptops are interesting.	( )	( )	( )	( )
(d) Using a laptop allows me to tackle complicated activities.	( )	( )	( )	( )
(e) I make an effort to complete activities involving my laptop.	( )	( )	( )	( )
(f) I feel motivated at school when working on activities using my laptop.	( )	( )	( )	( )
(g) I am given a choice to use a laptop for school work.	( )	( )	( )	( )
(h) I use a laptop outside of school.	( )	( )	( )	( )

Laptop usage (Frequency of laptop use)

4) Estimate the average time in minutes you spent using your laptop at school for each day of the week in Term Three.

	Less than 30 minutes	30 minutes	1 hour	2 - 3 hours	More than 3 hours
Monday	( )	( )	( )	( )	( )
Tuesday	( )	( )	( )	( )	( )
Wednesday	( )	( )	( )	( )	( )
Thursday	( )	( )	( )	( )	( )
Friday	( )	( )	( )	( )	( )

Laptop use (Feelings towards laptop use)

5) Do you have any difficulties in using your laptop?

( ) Yes

( ) No

Please comment:

____

____

6) Is there something you really enjoy about using your laptop?

( ) Yes

( ) No

Please comment:

____

____

7) Is there something you would like to know more about when using a laptop?

( ) Yes

( ) No

Please comment:

____

____

Skills rating (ICT competencies)

Please rate yourself on your skill level in using each of these types of software and equipment.

Select the statements that best describe your skills. You may choose more than one statement.

8)
(a) Word processor

( ) Can't do much.

( ) Can format a document, change fonts, spell check, insert text, add footer and page numbers.

( ) Can insert images, create tables, change page setup, change margins.

( ) Use columns and sections, set up styles, use mail merge.

(b) Spreadsheets

( ) Can't do much.

( ) Can enter data, use sort, create charts [graphs] and modify them.

( ) Can insert some calculations, format cells, insert and delete rows and columns.

( ) Can use complex formulae, use absolute and relative cell references.

(c) Slideshow software

( ) Can't do much.

( ) Can create a slideshow, insert images, change font and layout.

( ) Can navigate during a presentation, add animation and transitions, insert hyperlinks.

( ) Can create a master slide, include sound, print handouts, add navigation buttons.

(d) Email

( ) Can't do much.

( ) Can create, send and access emails, add to and access address book entries.

( ) Can store messages in folders, locate sent and deleted messages, manage address book.

( ) Can add a signature, add attachments, set up and send a group email, apply rules to manage emails.

(e) Computer file management

( ) Can't do much.
( ) Can save files in a folder, create and name folders, navigate between folders, copy, delete and rename files.
( ) Can recognise different file types, navigate between drives and directories access a network, use help files.
( ) Can zip and unzip files, install software.

(f) The Internet

( ) Can't do much.
( ) Can navigate to known web sites, create favourites, do basic searches.
( ) Can save images and text, use advanced search tools, organise favourites.
( ) Can conduct complex searches, download and install software, use different browsers, alter browser preferences.

(g) Web page authoring

( ) Can't do much.
( ) Can create pages and links, insert and format text, insert images.
( ) Can use tables, create external links and email links.
( ) Can create a website with pages and folders, insert sound, upload files to the web.

(h) Digital photography

( ) Can't do much.
( ) Can take photos or video and use on a computer.
( ) Can edit images / video on camera, adjust basic camera settings (e.g., flash, red-eye, zoom).
( ) Can edit and modify images, crop, adjust shadows, exposure, contrast and edit resolution. Adjust camera settings considering environment and purpose.

(i) Image editing

( ) Can't do much.
( ) Can do simple editing such as crop, delete and draw.
( ) Can change image size, format and resolution.
( ) Can undertake complex image manipulation using special effects.

(j) Video editing/podcasting/movie making

( ) Can't do much.
( ) Can do simple editing such as a crop, delete and insert.
( ) Can use basic software to introduce transitions, import and edit sound track, add titles and subtitles.
( ) Can use advanced software to apply complex editing and special effects.

(k) Blogs and wikis

( ) Can't do much.
( ) Contributes to wikis and writes a blog.
( ) Make comments on other blogs, create own wiki.
( ) Go to other wikis and enhance the quality of the wiki for an audience. Organise an ongoing series of blogs.

9) List the software you use for your school work:

____
____

Laptop use (Impact on learning)

On a scale of 1 to 5 (1 being low and 5 being high) rate the following statements:

10) Have there been any changes in your learning because of your use of the laptop?

( ) 1 - Low
( ) 2
( ) 3
( ) 4
( ) 5 - High

11) Rate your level of engagement towards learning since you received your laptop?

( ) 1 - Low
( ) 2
( ) 3
( ) 4
( ) 5 – High

12) What was your motivation prior to the introduction of the laptop program?

( ) 1 - Low
( ) 2
( ) 3
( ) 4
( ) 5 – High

13) What is your level of motivation since the introduction of the laptop program?

( ) 1 - Low
( ) 2
( ) 3
( ) 4
( ) 5 – High

14) Please choose the selection that best represents your laptop use in relation to the following activities:

Laptops use at home	**Everyday**	**2-3 times a week**	**Every two weeks**	**Once a month**	**Never**
(a) Surfing the web	( )	( )	( )	( )	( )
(b) Emails	( )	( )	( )	( )	( )
(c) Instant messaging/MSN	( )	( )	( )	( )	( )
(d) Webcam chatting	( )	( )	( )	( )	( )
(e) Social networking-Facebook or Myspace	( )	( )	( )	( )	( )
(f) Watching and sharing information-YouTube etc.	( )	( )	( )	( )	( )
(g) Word processing/Powerpoint/Keynote	( )	( )	( )	( )	( )
(h) Playing games	( )	( )	( )	( )	( )

Mobile phone use

15) Do you have your own mobile phone?

( ) Yes

( ) No

16) I use my mobile phone for: (please choose the amount that best represent you)

Mobile phone use	**Everyday**	**2-3 times a week**	**Every two weeks**	**Once a month**	**Never**
(a) Surfing the web	( )	( )	( )	( )	( )
(b) Text messaging (SMS)	( )	( )	( )	( )	( )
(c) Multimedia Messaging (MMS)	( )	( )	( )	( )	( )
(d) Making phone calls	( )	( )	( )	( )	( )
(e) Downloading ringtones and applications	( )	( )	( )	( )	( )
(f) Listening to music	( )	( )	( )	( )	( )
(h) Viewing movies	( )	( )	( )	( )	( )
(i) Playing games	( )	( )	( )	( )	( )
(j) Taking photos or video	( )	( )	( )	( )	( )

Other ways I use my mobile phone:

____

____

Social media

17) The social networking sites I use are: (You can choose more than one)

( ) I don't use any

( ) Myspace

( ) Facebook

( ) Bebo

( ) Club penguin

( ) Twitter

Other (please specify):

____

____

18) On my social networking site I have: (You may select more than one)

( ) I don't have a social networking site

( ) My first name

( ) The suburb I live in

( ) My mobile number

( ) My last name

( ) My school's name

( ) My street address

( ) A photo of myself

( ) My birth date

( ) My sporting club's name

( ) Friends I don't know in real life

( ) Friends I know through other friends

( ) Friends I only know in real life

Gaming

19) I play online games with: (You may select more than one)

( ) I do not play online games

( ) Friends I only know in real life

( ) Friends I don't know in real life

( ) The chat features turned on

( ) With a headset on

20) I play online games: (please choose one)

( ) Everyday
( ) 2-3 times a week
( ) Every two weeks
( ) Once a month
( ) Never

21) The online games I play are:

---

22) The game console I have is a:

( ) XBOX
( ) Wii
( ) Playstation
( ) DS
( ) PSP
( ) None

Other:

---

23) I use my game console for: (Please the choose the amount that best represents your use)

	Everyday	**2-3 times a week**	**Every two weeks**	**Once a month**	**Never**
(a) Playing games	( )	( )	( )	( )	( )
(b) Accessing the Internet	( )	( )	( )	( )	( )
(c) Online shopping	( )	( )	( )	( )	( )
(d) Chat	( )	( )	( )	( )	( )
(e) Viewing movies	( )	( )	( )	( )	( )
(f) Listening to music	( )	( )	( )	( )	( )

24) Other ways I use my console:

1:1 Laptop program (Comments)

25) Do you have any other comments about the laptop program?

Thank You! Thank you for taking part in this questionnaire. Your response is very important.

APPENDIX B:
Annual Teacher Questionnaires

Teacher Questionnaire: (Annual) First Year

Instructions for completing the survey:

You can go back to review or change your answers by clicking on the 'Back' button.

All responses will be anonymous.

Thank you for taking the time to complete this questionnaire to the best of your ability.

It should take **approximately 15 minutes**.

Please click the 'Next' button to start.

Laptop use for learning

In the boxes below briefly describe what you regard as the best example from the past 12 months that illustrate the use of laptops for each purpose.

Choose the proportion of time your students spend on activities like this.

1) Laptops were used to investigate reality and build knowledge:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

2) Laptops were used to promote active learning and authentic assessment:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

3) Laptops were used to engage students by motivation and challenge:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

4) Laptops were used to provide tools to increase student productivity:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

5) Laptops were used to provide scaffolding to support higher order thinking:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

6) Laptops were used to increase learner independence:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

7) Laptops were used to increase collaboration or cooperation:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

8) Laptops were used to tailor learning to the learner or develop individualised learning pathways:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

9) Laptops were used to overcome physical disabilities or other (e.g., learning):

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

ICT use

10) Which one of the following descriptions best fits your present situation.

( ) I am aware that ICT can be used to support student learning but have not used it - perhaps even avoiding it.

( ) I am currently trying to learn the basics. I am often frustrated using laptops. I lack confidence when using laptops.

( ) I am beginning to understand the process of using ICT and can think of specific tasks in which it might be useful.

( ) I am gaining a sense of confidence in using the laptop for specific tasks. I am starting to feel comfortable using the laptop.

( ) I think about the laptop as a tool to help me and am no longer concerned about it as a technology. I can use it in many applications and as an instructional aid.

( ) I can apply what I know about ICT in the classroom. I am able to facilitate its use as a learning tool and integrate it into the curriculum.

( ) ICT has transformed the way in which I facilitate student learning.

Frequency of laptop use

11) Estimate the amount of time you use your laptop for teaching and learning each day.

Day	**0 minutes**	**Less than 30 minutes**	**30 minutes**	**1 hour**	**2 - 3 hours**	**More than 3 hours**
Monday	( )	( )	( )	( )	( )	( )
Tuesday	( )	( )	( )	( )	( )	( )
Wednesday	( )	( )	( )	( )	( )	( )
Thursday	( )	( )	( )	( )	( )	( )
Friday	( )	( )	( )	( )	( )	( )

12) Estimate the amount of time your students use their laptops for learning each day.

Day	**0 minutes**	**Less than 30 minutes**	**30 minutes**	**1 hour**	**2 - 3 hours**	**More than 3 hours**
Monday	( )	( )	( )	( )	( )	( )
Tuesday	( )	( )	( )	( )	( )	( )
Wednesday	( )	( )	( )	( )	( )	( )
Thursday	( )	( )	( )	( )	( )	( )
Friday	( )	( )	( )	( )	( )	( )

Teacher views about laptop use

13) Do you have any difficulties in using your laptop?

( ) Yes

( ) No

Comment

____

____

____

14) Is there something you really enjoy about using your laptop?

( ) Yes

( ) No

Comment

____

____

____

15) Is there something you would like to know more about when using a laptop?

( ) Yes

( ) No

Comment

____

____

____

Skills rating: ICT competencies

Please rate yourself on your skill level in using each of these types of software and equipment.
Select the statements that best describes your skills. You may choose more than one statement.

16) (a) Word processor

( ) Can't do much.

( ) Can format a document, change fonts, spell check, insert text, add footer and page numbers.

( ) Can insert images, create tables, change page setup, change margins.

( ) Use columns and sections, set up styles, use mail merge.

(b) Spreadsheets

( ) Can't do much.

( ) Can enter data, use sort, create charts [graphs] and modify them.

( ) Can insert some calculations, format cells, insert and delete rows and columns.

( ) Can use complex formulae, use absolute and relative cell references.

(c) Slideshow software

( ) Can't do much

( ) Can create a slideshow, insert images, change font and layout

( ) Can navigate during a presentation, add animation and transitions, insert hyperlinks

( ) Can create a master slide, include sound, print handouts, add navigation buttons.

(d) Email

( ) Can't do much.

( ) Can create, send and access emails, add to and access address book entries.

( ) Can store messages in folders, locate sent and deleted messages, manage address book.

( ) Can add a signature, add attachments, set up and send a group email, apply rules to manage emails.

(e) Computer file management

( ) Can't do much.

( ) Can save files in a folder, create and name folders, navigate between folders, copy, delete and rename files.

( ) Can recognise different file types, navigate between drives and directories access a network, use help files.

( ) Can zip and unzip files, install software

(f) The Internet

( ) Can't do much.

( ) Can navigate to known web sites, create favourites, do basic searches.

( ) Can save images and text, use advanced search tools, organise favourites.

( ) Can conduct complex searches, download and install plugins, use different browsers, alter browser preferences.

(g) Web page authoring

( ) Can't do much.

( ) Can create pages and links, insert and format text, insert images.

( ) Can use tables, create external links and email links.

( ) Can create a website with pages and folders, insert sound, upload files to the web.

(h) Digital photography

( ) Can't do much.

( ) Can take photos or video and use on a computer.

( ) Can edit images / video on camera, adjust basic camera settings (e.g., flash, red-eye, zoom).

( ) Can edit and modify images, crop, adjust shadows, exposure, contrast and edit resolution. Adjust camera settings considering environment and purpose.

(i) Image editing

( ) Can't do much.

( ) Can do simple editing such as crop, delete and draw.

( ) Can change image size, format and resolution.

( ) Can undertake complex image manipulation using special effects.

(j) Video editing/podcasting/movie making

( ) Can't do much.

( ) Can do simple editing such as a crop, delete and insert.

( ) Can use basic software to introduce transitions, import and edit sound track, add titles and subtitles.

( ) Can use advanced software to apply complex editing and special effects.

(k) Blogs and wikis

( ) Can't do much.

( ) Contributes to wikis and writes a blog.

( ) Make comments on other blogs, create own wiki.

( ) Go to other wikis and enhance the quality of the wiki for an audience. Organise an ongoing series of blogs.

17) List the software you use for your school work (ICT use):

____

____

____

Laptop use for personal/ professional use

18) Please choose the selection that best represents your laptop use for the following activities:

Laptop use	Everyday	2-3 times a week	Every two weeks	Once a month	Never
(a) Surfing the web	( )	( )	( )	( )	( )
(b) Emails	( )	( )	( )	( )	( )
(c) Instant messaging/MSN	( )	( )	( )	( )	( )
(d) Webcam chatting	( )	( )	( )	( )	( )
(e) Social networking-Facebook or Myspace	( )	( )	( )	( )	( )
(f) Watching and sharing information-YouTube etc.	( )	( )	( )	( )	( )
(g) Word processing/PowerPoint/Keynote	( )	( )	( )	( )	( )
(h) Playing games	( )	( )	( )	( )	( )

Social media

19) The social networking sites I use are: (You can choose more than one)

( ) Myspace

( ) Facebook

( ) Bebo

( ) Twitter

( ) I don't have one

Other:

____

____

____

Impact on learning

On a scale of 1 to 5 (1 being low and 5 being high) rate the following statements:

20) Have there been any changes in your students' learning since the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 – High

21) Do you feel students are more or less engaged towards learning since the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 – High

22) What was student motivation prior to the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 – High

23) What is the level of student motivation since the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 – High

24) What proportion of time would you like to see students using laptops in your classes?

( ) <10%

( ) 10-25%

( ) 25-50%

( ) 50-75%

( ) >75%

25) Do you think that laptops should be used to improve student learning with your class(es)?

( ) Yes

( ) No

( ) Not sure

Why? (Please explain briefly)

____

____

____

26) Do you have any other comments about the laptop program?

____

____

____

Thank You! Thank you for taking part in this questionnaire. Your response is very important.

Teacher Questionnaire: (Annual) Second and Third Year

Instructions for completing the survey:

You can go back to review or change your answers by clicking on the 'Back' button.

All responses will be anonymous.

Thank you for taking the time to complete this questionnaire to the best of your ability.

It should take **approximately 15 minutes**.

Please click the 'Next' button to start.

Laptop use for learning

In the boxes below briefly describe what you regard as the best example from the past 12 months that illustrate the use of laptops for each purpose.

Choose the proportion of time your students spend on activities like this.

1) Laptops were used to investigate reality and build knowledge:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

____

____

2) Laptops were used to promote active learning and authentic assessment:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

____

____

3) Laptops were used to engage students by motivation and challenge:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

---

4) Laptops were used to provide tools to increase student productivity:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

---

5) Laptops were used to provide scaffolding to support higher order thinking:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

---

6) Laptops were used to increase learner independence:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

---

7) Laptops were used to increase collaboration or cooperation:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

____

____

8) Laptops were used to tailor learning to the learner or develop individualised learning pathways:

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

____

____

9) Laptops were used to overcome physical disabilities or other (e.g., learning):

( ) 0-5%

( ) 5-10%

( ) 10-25%

( ) 25-50%

( ) >50%

Comments:

____

____

ICT use

10) Which one of the following descriptions best fits your present situation.

( ) I am aware that ICT can be used to support student learning but have not used it - perhaps even avoiding it.

( ) I am currently trying to learn the basics. I am often frustrated using laptops. I lack confidence when using laptops.

( ) I am beginning to understand the process of using ICT and can think of specific tasks in which it might be useful.

( ) I am gaining a sense of confidence in using the laptop for specific tasks. I am starting to feel comfortable using the laptop.

( ) I think about the laptop as a tool to help me and am no longer concerned about it as a technology. I can use it in many applications and as an instructional aid.

( ) I can apply what I know about ICT in the classroom. I am able to facilitate its use as a learning tool and integrate it into the curriculum.

( ) ICT has transformed the way in which I facilitate student learning.

Frequency of laptop use

11) Estimate the amount of time you use your laptop for teaching and learning each day.

Day	0 minutes	Less than 30 minutes	30 minutes	1 hour	2 - 3 hours	More than 3 hours
Monday	( )	( )	( )	( )	( )	( )
Tuesday	( )	( )	( )	( )	( )	( )
Wednesday	( )	( )	( )	( )	( )	( )
Thursday	( )	( )	( )	( )	( )	( )
Friday	( )	( )	( )	( )	( )	( )

12) Estimate the amount of time your students use their laptops for learning each day.

Day	0 minutes	Less than 30 minutes	30 minutes	1 hour	2 - 3 hours	More than 3 hours
Monday	( )	( )	( )	( )	( )	( )
Tuesday	( )	( )	( )	( )	( )	( )
Wednesday	( )	( )	( )	( )	( )	( )
Thursday	( )	( )	( )	( )	( )	( )
Friday	( )	( )	( )	( )	( )	( )

Teacher views about laptop use

13) Do you have any difficulties in using your laptop?

( ) Yes

( ) No

Please explain:

____

____

____

14) Is there something you really enjoy about using your laptop?

( ) Yes

( ) No

Please explain:

____

____

____

15) Is there something you would like to know more about when using a laptop?

( ) Yes

( ) No

Please explain:

____

____

Skills rating: ICT competencies

Please rate yourself on your skill level in using each of these types of software and equipment.

Select the statements that best describes your skills. You may choose more than one statement.

16)
(a) Word processor

( ) Can't do much.

( ) Can format a document, change fonts, spell check, insert text, add footer and page numbers.

( ) Can insert images, create tables, change page setup, change margins.

( ) Use columns and sections, set up styles, use mail merge.

(b) Spreadsheets

( ) Can't do much.

( ) Can enter data, use sort, create charts [graphs] and modify them.

( ) Can insert some calculations, format cells, insert and delete rows and columns.

( ) Can use complex formulae, use absolute and relative cell references.

(c) Slideshow software

( ) Can't do much.

( ) Can create a slideshow, insert images, change font and layout.

( ) Can navigate during a presentation, add animation and transitions, insert hyperlinks.

( ) Can create a master slide, include sound, print handouts, add navigation buttons.

(d) Email

( ) Can't do much.

( ) Can create, send and access emails, add to and access address book entries.

( ) Can store messages in folders, locate sent and deleted messages, manage address book.

( ) Can add a signature, add attachments, set up and send a group email, apply rules to manage emails.

(e) Computer file management

( ) Can't do much.

( ) Can save files in a folder, create and name folders, navigate between folders, copy, delete and rename files.

( ) Can recognise different file types, navigate between drives and directories access a network, use help files.

( ) Can zip and unzip files, install software.

(f) The Internet

( ) Can't do much.

( ) Can navigate to known web sites, create favourites, do basic searches.

( ) Can save images and text, use advanced search tools, organise favourites.

( ) Can conduct complex searches, download and install plugins, use different browsers, alter browser preferences.

(g) Web page authoring

( ) Can't do much.

( ) Can create pages and links, insert and format text, insert images.

( ) Can use tables, create external links and email links.

( ) Can create a website with pages and folders, insert sound, upload files to the web.

(h) Digital photography

( ) Can't do much.

( ) Can take photos or video and use on a computer.

( ) Can edit images / video on camera, adjust basic camera settings (e.g., flash, red-eye, zoom).

( ) Can edit and modify images, crop, adjust shadows, exposure, contrast and edit resolution. Adjust camera settings considering environment and purpose.

(i) Image editing

( ) Can't do much.

( ) Can do simple editing such as crop, delete and draw.

( ) Can change image size, format and resolution.

( ) Can undertake complex image manipulation using special effects.

(j) Video editing/podcasting/movie making

( ) Can't do much.

( ) Can do simple editing such as a crop, delete and insert.

( ) Can use basic software to introduce transitions, import and edit sound track, add titles and subtitles.

( ) Can use advanced software to apply complex editing and special effects.

(k) Blogs and wikis

( ) Can't do much.

( ) Contributes to wikis and writes a blog.

( ) Make comments on other blogs, create own wiki.

( ) Go to other wikis and enhance the quality of the wiki for an audience. Organise an ongoing series of blogs.

17) List the software you use for your school work: (ICT use)

____

____

Laptop use for personal/professional use

18) Please choose the selection that best represents your laptop use for the following activities:

	Everyday	**2-3 times a week**	**Every two weeks**	**Once a month**	**Never**
(a) Surfing the web	( )	( )	( )	( )	( )
(b) Emails	( )	( )	( )	( )	( )
(c) Instant messaging/MSN	( )	( )	( )	( )	( )
(d) Webcam chatting	( )	( )	( )	( )	( )
(e) Social networking-Facebook or Myspace	( )	( )	( )	( )	( )
(f) Watching and sharing information-YouTube etc.	( )	( )	( )	( )	( )
(g) Word processing/Powerpoint/Keynote	( )	( )	( )	( )	( )
(h) Playing games	( )	( )	( )	( )	( )

Social media

19) The social networking sites I use are: (You can choose more than one)

( ) Myspace

( ) Facebook

( ) Bebo

( ) Twitter

( ) I don't have one

Other:

____

Mobile phones*

20) The type of smartphone I own is (a smartphone is a mobile phone that offers more advanced computing ability than a standard phone):

( ) I don't own a smartphone

( ) Apple iPhone

( ) Blackberry

( ) HTC

( ) LG

( ) Motorola

( ) Nokia

( ) Samsung

( ) Sony Ericson

( ) Other

Other:

Note. *=As discussed in Chapter Three, section 3.6.4.1 the annual questionnaire changed for both the teachers and parents from the first year to the second year of the study due to the emergence of consistent themes. All changes are in red and Appendix H outlines the specific changes.

Impact on learning

On a scale of 1 to 5 (1 being low and 5 being high) rate the following statements:

21) Have there been any changes in your students' learning since the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

( ) Not sure

22) Do you feel students are more or less engaged towards learning since the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

( ) Not sure

23) What was student motivation prior to the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

( ) Not sure

24) What is the level of student motivation since the introduction of the laptop program?

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

( ) Not sure

25) What proportion of time would you like to see students using laptops in your classes?

( ) <10%

( ) 10-25%

( ) 25-50%

( ) 50-75%

( ) >75%

26) Do you think that laptops should be used to improve student learning with your class(es)?

( ) Yes

( ) No

( ) Not sure

Why? (Please explain briefly)

____

____

____

Monitoring / Gaming / Professional Development

27) To what extent do you agree with each of the following statements:

	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
(a) Introducing parental controls has been worthwhile.	( )	( )	( )	( )	( )
(b) Student focus towards learning has improved since the introduction of parental controls and other monitoring processes adopted by the College.	( )	( )	( )	( )	( )
(c) Implementing a clear framework for acceptable ICT use has improved the classroom dynamic (Step 1, 2, 3 & 4 framework).	( )	( )	( )	( )	( )
(d) Playing games in class is still a problem.	( )	( )	( )	( )	( )
(e) The amount of ICT professional development has been adequate.	( )	( )	( )	( )	( )
(f) I am now comfortable using the Apple platform.	( )	( )	( )	( )	( )

Laptop program: Comments

28) Do you have any other comments about the laptop program?

____

____

____

Thank You! Thank you for taking part in this questionnaire. Your response is very important.

APPENDIX C:
Interviews: Students and Teachers

Student Interview

Name: ___________________

Year level: ___________________

Date: ___________________

Semi-structured Interview questions

1. How have you used your laptop at school over the last 12 months?

2. Have you changed the way you use your laptop in the last 12 months? If so in what ways?

3. How do you use your laptop for research?

4. When you used a web search for information, how did you decide which was the most important information?

5. How do you use your laptop for creative work?

6. How do you use your laptop for solving problems?

7. Give me an example of an activity you really enjoyed that required you to use your laptop? (What made the activity so enjoyable)?

8. How do you use your laptop for communication?
   - Can you give me an example of an activity in which electronic communication was really helpful? Tell me how it worked.

9. What challenges, if any have you faced using the laptop each day?

10. How have you overcome these challenges?
    - Who did you ask/tell?
    - How did you feel about these challenges?

11. To what extent has the use of a laptop helped you organise your thoughts?

12. What is it like having a classroom with each student having their own laptop?
    - Classroom dynamic, behaviour

13. Do think you are more focussed as a student with your own laptop? Explain.

14. Are lessons more interesting with the use of a laptop? What has changed?

15. If you were asked to design an activity for your year level that was challenging and really interesting, a favourite lesson, what would it be? Give me an example.

16. What advice would you give a group of students who were asked to work on a group activity or assignment outside class time?

17. How is this different when you are working by yourself? How can using a laptop help in this process?

18. If you use your laptop outside of school how do you use it?

19. Do you feel confident in using the laptop and its software applications?

20. Have there been any changes in your learning since you have had a laptop? Explain

21. Do you feel more or less engaged towards learning since you received your laptop?

22. On a scale of 1 to 5 (1 being low, 5 being high) what was your level of motivation prior to the introduction of the laptop program? Explain

23. On a scale of 1 to 5 (1 being low, 5 being high) what is your level of motivation since the introduction of the laptop program? Explain

24. Do you think parental controls make a difference?

25. To what extent has the monitoring (keystroke/screen checking) of the network had on you in how you use your laptop at school?

26. Is there anything you don't like about the laptop program/What would you change?

27. How do your parents help with your laptop?

28. Whilst in class each day, do you notice boys playing games during lessons?
    - If so, to what extent is it a distraction or not?

29. Do you think games can help you to learn? If so how?

30. If you were in a position of power would you keep the 1:1 laptop program or remove it?

31. Do you have any other comments?

Teacher Interview

Name: ________________________ Teaching Year level: ____________

Date: __________________________ Gender: Male / Female

Learning area: __________________________

Years of teaching experience:_____________yrs Years at present school:_______________yrs

Age: (Circle one of the following ranges)

20-24 or 25-29 or 30-34 or 35-39 or 40-44 or 45-49 or 50-54 or 55-59 or 60+

Semi-structured Interview questions

1. How do you use laptops to support student learning?

2. What are the main purposes for you to use ICT with your students?

3. What would you like to use laptops for with your classes that you do not do at present?

4. Do you think that there is value in having your students use a laptop in your class?

5. How do you use ICT in the broader context of education (Society)
(There knowledge and skills)?

6. Have you assessed work that students have done with laptops and how has this been included with your overall assessment process?

   - Do you find that your students are generally on time with their assignments?

7. How important is the use of laptops to your assessment processes?

8. What do you see as your main role(s) when using laptops with your classes?

9. What role(s) do the students have when using laptops for learning?

10. Describe support you receive from others in the implementation of laptop support for learning.

11. What support do your students have in their use of laptops?

12. Compared with all other teachers that you know, how student-centred would you say you were?
-If you could wave a magic wand, would you like to be more or less student-centred?

13. Describe the classroom dynamics since the onset of the laptop implementation?

14. Have there been any changes in student learning since you have been teaching with each student having their own laptop? How do you know?

15. Do you feel that students are more or less engaged towards learning since they received their laptop?

16. On a scale of 1 to 5 (1 being low, 5 being high) what was the general level of student motivation prior to the introduction of the laptop program?

17. On a scale of 1 to 5 (1 being low, 5 being high) what is the general level of motivation since the introduction of the laptop program?

18. Do you have any concerns about the laptop program?

19. Did you notice any change in student ICT use with the introduction of parental controls/monitoring of the network?

20. Is there an area of Professional Development that you require in the use of ICT? (e.g., Support with finding content, using ICT for communication, creativity etc)

21. Would you like to see more parental involvement in optimizing the use of the laptop as a learning tool? If so how do you think the College should go about this?

22. Do you have any other comments?

23. Would you keep the laptop program or remove it?

APPENDIX D:
School Leadership Interviews

Headmaster (Interviewed in First and Third Year)

Points below are intended as prompts to guide a conversation about the specific topics.

The aim is to benefit from the ICT global view of the one-to-one laptop program.

1. What do you hope will come out of the implementation of the one-to-one laptop program in the longer term? What do you want to see it achieve?

2. What did you expect the outcome to be after 12 months?
   – What has been achieved so far?
   – What has being part of one-to-one laptop program done for the school, the staff, the students?

3. What have been the best decisions you / the College has made with respect to the project?

4. What has got in the way of further progress?

5. How would you describe the overall level of student engagement / learning outcomes during this 12 month period?
   – Are there differences across different year groups or student groups?
   – Is this typical for the school?

6. Are you seeing any changes?
   – If so, can you give examples of exemplary practice?
   – How prevalent is this?

7. Are there any specific initiatives which have made a major contribution?

8. Are there any factors which limit what can be achieved?
   – Which ones can the school influence?
   – What could be done?
   – By whom?

9. Can you tell me about one of the more exciting or significant developments which happened this year?

10. What are the most significant impediments for teachers?
    – Which ones can the school tackle?
    – How?

11. With the benefit of hindsight, what would you do differently?

12. What do you hope will be achieved in the next 12 months with respect to one-to-one laptop program?

13. What internal factors will limit or enhance the achievements?

14. What external factors are likely impinged on this vision?

15. Are there any other comments you would like to make?

Deputy Headmaster / Director of ICT (Interviewed in First and Third Year)

Points below are intended as prompts to guide a conversation about the specific topics. The aim is to benefit from the ICT global view of the one-to-one laptop program.

1. What do you hope will come out of the implementation of the one-to-one laptop program in the longer term? What do you want to see it achieve?

2. What did you expect the outcome to be after 12 months?
   – What has been achieved so far?
   – What has being part of one-to-one laptop program done for the school, the staff, the students?

3. What have been the best decisions you / the College has made with respect to the project?

4. What has got in the way of further progress?

5. How would you describe the overall level of student engagement / learning outcomes during this 12 month period?
   – Are there differences across different year groups or student groups?
   – Is this typical for the school?

6. Are you seeing any changes?
   – If so, can you give examples of exemplary practice? / How prevalent is this?

7. Are there any specific initiatives which have made a major contribution?

8. Are there any factors which limit what can be achieved?
   – Which ones can the school influence?
   – What could be done? / By whom?

9. How would you describe the overall level of staff ICT competency at the moment?
   – Has this changed much over the last 12 months?
   – If so, what have been the drivers of that change?

10. What processes have been / are being used to identify, prioritise needs and plan for PD?

11. What sort of PD has been most useful / powerful?
    – What has your role been in this?

12. What are your plans for the coming year?

13. Can you tell me about one of the more exciting or significant developments which happened this year?

14. What are the most significant impediments for teachers?
    – Which ones can the school tackle? / How?

15. With the benefit of hindsight, what would you do differently?

16. What do you hope will be achieved in the next 12 months with respect to one-to-one laptop program?

17. What internal factors will limit or enhance the achievements?

18. What external factors are likely impinge on this vision?

19. Are there any other comments you would like to make?

Dean of Academic Studies (Interviewed Annually)

Points below are intended as prompts to guide a conversation about the specific topics. The aim is to benefit from the ICT global view of the one-to-one laptop program.

1. What do you hope will come out of the implementation of the one-to-one laptop program in the longer term? What do you want to see it achieve?

2. What did you expect the outcome to be after 12 months?
   – What has been achieved so far?
   – What has being part of one-to-one laptop program done for the school, the staff, the students?

3. What have been the best decisions you / the College has made with respect to the project?

4. What has got in the way of further progress?

5. How would you describe the overall level of student engagement / learning outcomes during this 12 month period?
   – Are there differences across different year groups or student groups?
   – Is this typical for the school?

6. Are you seeing any changes?
   – If so, can you give examples of exemplary practice?
   – How prevalent is this?

7. Are there any specific initiatives which have made a major contribution?

8. Are there any factors which limit what can be achieved?
   – Which ones can the school influence?
   – What could be done?
   – By whom?

9. How would you describe the overall level of staff ICT competency at the moment?
   – Has this changed much over the last 12 months?
   – If so, what have been the drivers of that change?

10. What processes have been / are being used to identify, prioritise needs and plan for PD?

11. What sort of PD has been most useful / powerful?
    – What has your role been in this?

12. What are your plans for the coming year?

13. How do you find out about what is going on in the various classes?

14. How is this information communicated to other staff?
    – Are there other ways you would like this information to be shared?

15. Can you tell me about one of the more exciting or significant developments which happened this year?

16. What are the most significant impediments for teachers?
    – Which ones can the school tackle?
    – How?

17. Is there a need for teachers to change their pedagogy to improve student engagement /learning outcomes? If so, in what ways?

18. Has teacher use of ICT been accompanied by a change in the learning environment? For example:
– Investigate reality and build knowledge
– Promote active learning and authentic assessment
– Engage students by motivation and challenge
– Provide tools to increase student productivity
– Provide scaffolding to support higher level thinking
– Increase learner independence
– Increase collaboration and cooperation
– Tailor learning to the learner
– Overcome physical disabilities.

19. If so, is it possible to identify any academic impact on students?
– How has this come about?
– Can you give some examples?

20. With the benefit of hindsight, what would you do differently?

21. Are you in a position to comment on the impact of the use of ICT on student learning outcomes?
– If so, what global measures do you, as Dean of Academic Studies consider important ways of assessing student learning outcomes.

22. How have the students performed on these measures?

23. What do you hope will be achieved in the next 12 months with respect to one-to-one laptop program?

24. What external factors are likely impinge on this vision?

25. Are there any other comments you would like to make?

APPENDIX E:
Research Information and Consent

INFORMATION SHEET

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

Dear potential participant,

My name is Steven Males. I am a student at The University of Notre Dame Australia enrolled in the Doctor of Philosophy course. A requirement of this course is to under-take a significant research project.

The title of the project is 'One-to-one laptop program: Effect on boys' education.'

My research concerns with the implementation of the one-to-one laptop program at Aquinas College.

The purpose of the study is to examine the implementation and determine the effect on areas such as teacher and student use of laptops; educational impact; and identifying the possible differences between junior and middle school implementation experiences.

Participants will take part in a 30-45 minute tape-recorded interviews and 10-15 minute survey questionnaires. Information collected during interviews, surveys and classroom observations (including artifacts e.g., lesson plans) will be strictly confidential. I will be conducting all of these interviews and designing and implementing the survey questionnaires. This confidence will only be broken in the instance of legal requirements such as court subpoenas, freedom of information requests or mandated reporting by some professionals. To protect the anonymity of participants in this, a code will be ascribed to each of the participants to minimise the risk of identification. Involvement in this research is voluntary and you are free to withdraw consent at any time, and to withdraw any unprocessed data previously supplied.

The protocol adopted by the University of Notre Dame Australia Human Research Ethics Committee for the protection of privacy will be adhered to and relevant sections of the *Privacy Act* are available at http://www.nhmrc.gov.au/

You will be offered a transcript of the interview, and I would be grateful if you would comment on whether you believe we have captured your experience. You will also be informed of the results of the research with the provision of a debrief, including if you elect to withdraw. Before the interview I will ask you to sign a consent form. You may withdraw from the project at any time. Data collected will be stored securely in the University's School of Education for five years. No identifying information will be used and the results from the study will be made freely available to all participants.

As I am the Head of the Junior School and have contact with students at the College I must make it clear that my intended research will not affect ongoing assessment, grades or management of any of these students.

The Human Research Ethics Committee of the University of Notre Dame Australia has approved the study.

Associate Professor Jean Macnish of the University of Notre Dame is supervising the project. If you have any queries regarding the research, please contact me directly or Associate Professor Macnish by phone (08) 9433 0544 or by email at jmacnish@nd.edu.au

I thank you for your consideration and hope you will agree to participate in this research project.
Yours sincerely,
Mr Steven Males
Tel: (08) 9450 0614 Email: smales@nd.edu.au

If participants have any complaint regarding the manner in which a research project is conducted, it should be directed to the Executive Officer of the Human Research Ethics Committee, Research Office, The University of Notre Dame Australia, PO Box 1225 Fremantle WA 6959, phone (08) 9433 0943.

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

CONSENT FORM

One-to-one laptop: Effect on boys' education

INFORMED CONSENT FORM

I, *(participant's name)* ________________________________hereby agree to being a participant in the above research project.

I have and understood the Information Sheet about this project and any questions have been answered to my satisfaction.

I understand that I may withdraw from participating in the project at any time without prejudice.

I understand that all information gathered by the researcher will be treated as strictly confidential.

I agree that any research data gathered for the study may be published provided my name or other identifying information is not disclosed.

PARTICIPANT'S SIGNATURE:		DATE:	

RESEARCHER'S FULL NAME:			
RESEARCHER'S SIGNATURE:		DATE:	

If participants have any complaint regarding the manner in which a research project is conducted, it should be directed to the Executive Officer of the Human Research Ethics Committee, Research Office, The University of Notre Dame Australia, PO Box 1225 Fremantle WA 6959, phone (08) 9433 0943.

THE UNIVERSITY OF
NOTRE DAME
AUSTRALIA

CONSENT FORM: One-to-one laptop: Effect on boys' education

INFORMED CONSENT FORM FOR PARENT OR GUARDIAN

I, *(Parent/Guardian's name)* ____

of (*address*) ____

hereby consent to my child, (*child's name*)________________________________

being a volunteer in the above research project.

I have read and understood the Information Sheet about this project and any questions have been answered to my satisfaction.

I understand that I may withdraw from participating in the project at any time without prejudice.

I understand that all information gathered by the researcher will be treated as strictly confidential, except in instances of legal requirements such as court subpoenas, freedom of information requests, or mandated reporting by some professional.

Whilst the research involves small sample sizes I understand that a code will be ascribed to all participants to ensure that the risk of identification is minimised.

I understand that the protocol adopted by the University of Notre Dame Australian Human Research Ethics Committee for the protection of privacy will be adhered to and relevant sections of the *Privacy Act* are available at http://www.nhmrc.gov.au

I agree that any research data gathered for the study may be published provided my name or other identifying information is not disclosed.

PARENT/GUARDIAN'S SIGNATURE:		**DATE:**	

RESEARCHER'S FULL NAME:			
RESEARCHER'S SIGNATURE:		**DATE:**	

If participants have any complaint regarding the manner in which a research project is conducted, it should be directed to the Executive Officer of the Human Research Ethics Committee, Research Office, The University of Notre Dame Australia, PO Box 1225 Fremantle WA 6959, phone (08) 9433 0943.

APPENDIX F:
Annual Parent Questionnaires

Parent Questionnaire: (Annual) First Year

Instructions for completing the survey:

You can go back to review or change your answers by clicking on the 'Back' button.

All responses will be anonymous.

Thank you for taking the time to complete this questionnaire to the best of your ability.

It should take **approximately 5 - 10 minutes**. Please click the 'Next' button to start.

Laptop use at school

1) To what degree do you think that laptops are used in your son's school?

( ) Very little

( ) Not enough

( ) The correct amount

( ) Too much

Frequency of laptop use

2) Estimate the amount of time you think your child spends at home using his laptop for school work.

( ) Less than 1 hour a week

( ) 1 hour a week

( ) 3 hours a week

( ) 1 hour a day

( ) More than 1 hour a day

Laptop competencies

3) Rate your child's ability with using a laptop.

( ) Poor

( ) Fair

( ) Competent

( ) Very good

( ) Outstanding

Student learning

4) To what extent do you agree with each of the following statements about your son's education at the school at the moment.

Student learning	**Strongly agree**	**Agree**	**Don't know**	**Disagree**	**Strongly disagree**
(a) Authentic, real world concepts are usually provided to help my son's learning.	( )	( )	( )	( )	( )
(b) My son is often encouraged at school to think about information and come to his own conclusions.	( )	( )	( )	( )	( )
(c) My son often learns by doing practical things at school.	( )	( )	( )	( )	( )
(d) My son is usually assessed on the work he does rather than by tests and exams.	( )	( )	( )	( )	( )
(e) Work that my son produces using a laptop is assessed.	( )	( )	( )	( )	( )
(f) My son is very involved in work at school.	( )	( )	( )	( )	( )
(g) My son is usually motivated by work at school.	( )	( )	( )	( )	( )
(h) My son is usually challenged by work at school.	( )	( )	( )	( )	( )
(i) Laptops are used at school to help my son to do work faster, more accurately or better in some way.	( )	( )	( )	( )	( )
(j) My son is helped at school to think deeply about what is being learnt.	( )	( )	( )	( )	( )

Student learning

To what extent do you agree with each of the following statements about your son's education at the school at the moment.

Student learning	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
(k) My son is helped at school to analyse and interpret information.	( )	( )	( )	( )	( )
(l) My son is given independence at school to make choices about what he learns.	( )	( )	( )	( )	( )
(m) My son often seeks ideas from others at school or home.	( )	( )	( )	( )	( )
(n) My son often does work in groups in class.	( )	( )	( )	( )	( )
(o) My son often has work specially organised for him.	( )	( )	( )	( )	( )
(p) The school provides my son with plenty of opportunities to use his laptop.	( )	( )	( )	( )	( )
(q) The school gives me plenty of information about what my child is expected to do with his laptop.	( )	( )	( )	( )	( )
(r) The laptop program has given my son the opportunity to become more creative.	( )	( )	( )	( )	( )
(s) The laptop program has given my son the opportunity to become more inquiring.	( )	( )	( )	( )	( )
(t) The laptop program has given my son the opportunity to become a more active citizen in our community.	( )	( )	( )	( )	( )

Personal use of ICT

5) Choose the expression that best represents your knowledge and use of computers:

( ) non-user

( ) novice

( ) intermediate user

( ) experienced user

6) Please list the sorts and types of technology available at home:

____

____

Impact on learning

On a scale of 1 to 5 (1 being low and 5 being high) provide a rating response to the following statements:

7) Changes in your son's learning since he has had a laptop.

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

8) My son is more engaged towards learning since he received his laptop.

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

9) My son's motivation prior to the introduction of the laptop program.

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

10) My son's current level of motivation.

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

Comments

____

11) Are there any particular ways in which you would like to see the school use laptops?

____

____

____

12) Do you have any other comments about the laptop program? If yes, please comment:

____

____

____

If you would like to take part in a focus group discussion about some of the issues that will be raised by the responses to this survey please fill in your name and contact details below:

____

Thank You! Thank you for taking this survey. Your response is very important.

Parent Questionnaire: (Annual) Second and Third Year

Instructions for completing the survey:

All questions marked with an asterisk * must be answered in order to go on to the next page of the survey.

You can go back to review or change your answers by clicking on the 'Back' button.

All responses will be anonymous.

Thank you for taking the time to complete this questionnaire to the best of your ability.

It should take **approximately 5 - 10 minutes**. Please click the 'Next' button to start.

Laptop use at school

1) To what degree do you think that laptops are used in your son's school?

( ) Very little

( ) Not enough

( ) The correct amount

( ) Too much

( ) Don't know

Frequency of ICT use

2) Estimate the amount of time you think your child spends at home using his laptop for school work.

( ) Less than 1 hour a week

( ) 1 hour a week

( ) 3 hours a week

( ) 1 hour a day

( ) More than 1 hour a day

3) Do you believe this to be:

( ) Very little

( ) Not enough

( ) The correct amount

( ) Too much

Laptop competencies

4) Rate your child's ability with using a laptop.

( ) Poor

( ) Fair

( ) Competent

( ) Very good

( ) Outstanding

Student learning

5) To what extent do you agree with each of the following statements about your son's education at the school at the moment.

	Strongly agree	**Agree**	**Don't know**	**Disagree**	**Strongly disagree**
(a) Authentic, real world concepts are usually provided to help my son's learning.	( )	( )	( )	( )	( )
(b) My son is often encouraged at school to think about information and come to his own conclusions.	( )	( )	( )	( )	( )
(c) My son often learns by doing practical things at school.	( )	( )	( )	( )	( )
(d) My son is usually assessed on the work he does rather than by tests and exams.	( )	( )	( )	( )	( )
(e) Work that my son produces using a laptop is assessed.	( )	( )	( )	( )	( )
(f) My son is very involved in work at school.	( )	( )	( )	( )	( )
(g) My son is usually motivated by work at school.	( )	( )	( )	( )	( )
(h) My son is usually challenged by work at school.	( )	( )	( )	( )	( )
(i) Laptops are used at school to help my son to do work faster, more accurately or better in some way.	( )	( )	( )	( )	( )
(j) My son is helped at school to think deeply about what is being learnt.	( )	( )	( )	( )	( )

To what extent do you agree with each of the following statements about your son's education at the school at the moment.

	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
(k) My son is helped at school to analyse and interpret information.	( )	( )	( )	( )	( )
(l) My son is given independence at school to make choices about what he learns.	( )	( )	( )	( )	( )
(m) My son often seeks ideas from others at school or home.	( )	( )	( )	( )	( )
(n) My son often does work in groups in class.	( )	( )	( )	( )	( )
(o) My son often has work specially organised for him.	( )	( )	( )	( )	( )
(p) The school provides my son with plenty of opportunities to use his laptop.	( )	( )	( )	( )	( )
(q) The school gives me plenty of information about what my child is expected to do with his laptop.	( )	( )	( )	( )	( )
(r) The laptop program has given my son the opportunity to become more creative.	( )	( )	( )	( )	( )
(s) The laptop program has given my son the opportunity to become more inquiring.	( )	( )	( )	( )	( )
(t) The laptop program has given my son the opportunity to become a more active citizen in our community.	( )	( )	( )	( )	( )
(u) My son spends too much time using his laptop for gaming.	( )	( )	( )	( )	( )
(v) My son uses his laptop to access inappropriate sites.	( )	( )	( )	( )	( )
(w) When doing assignments my son has a cut and paste mentality when using his laptop.	( )	( )	( )	( )	( )
(x) Parental controls are beneficial for our son.	( )	( )	( )	( )	( )
(y) Things have improved since the introduction of the parental controls and other monitoring processes adopted by the College.	( )	( )	( )	( )	( )

Personal use of ICT

6) Choose the expression that best represents your knowledge and use of computers:

( ) non-user

( ) novice

( ) intermediate user

( ) experienced user

7) Please list the sorts and types of technology available at home:

____

8) Please rank the following applications used at home in terms of use, from highest to lowest:
________Word processing
________Internet
________Social networking
________Gaming
________Movies/Photography
________Research

Personal use of ICT

9) What computing platform do you use each day?

( ) PC

( ) Mac

( ) Both

( ) Neither

Mobile phones

10) The type of smartphone I own (a smartphone is a mobile phone that offers more advanced computing ability than a standard phone):

( ) I don't own a smartphone

( ) Apple iPhone

( ) Blackberry

( ) HTC

( ) LG

( ) Motorola

( ) Nokia

( ) Samsung

( ) Sony Ericson

( ) Other

Tablets

11) The type of tablet computer I have (a tablet is a mobile computer larger than a mobile phone which is touchscreen):

( ) I don't own a tablet computer

( ) Acer

( ) Apple - iPad

( ) Asus

( ) Blackberry

( ) HTC

( ) Kindle

( ) Motorola

( ) Sony

( ) Toshiba

( ) Other

Impact on learning

On the scale below provide a rating response to the following statements:

12) Impact on your son's learning since he has had a laptop.

Highly negative impact

( ) - 3

( ) - 2

( ) - 1

( ) (No impact) 0

( ) 1

( ) 2

( ) 3

Highly positive impact

13) The impact on you son's engagement (towards learning) since he received his laptop has been:

Highly negative impact

( ) -3

( ) - 2

( ) - 1

( ) 0

( ) 1

( ) 2

( ) 3

Highly positive impact

14) My son's motivation (towards learning) prior to the introduction of the laptop program.

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 - High

15) My son's current level of motivation towards learning.

( ) 1 - Low

( ) 2

( ) 3

( ) 4

( ) 5 – High

Support

16) This question relates to the extent to which you **support your son**.

How much time do you spend with your son using the laptop?

( ) Less than 1 hour a week

( ) 1 hour a week

( ) 3 hours a week

( ) 1 hour a day

( ) More than 1 hour a day

Comments

17) Are there any particular ways in which you would like to see the school use laptops?

____

____

____

18) Do you have any other comments about the laptop program? If yes, please comment:

____

____

19) If you would like to take part in a focus group discussion about some of the issues that will be raised by the responses to this survey please fill in your name and contact details below:

____

Thank You! Thank you for taking this survey. Your response is very important.

APPENDIX G: Inception Questionnaires: Student, Teacher and Parent

Inception Student Questionnaire: First Year

Please take your time to complete this questionnaire to the best of your ability.
It should take between 5 - 10 minutes of your time. Thank you.

Type of learning

1. Please answer the following questions by selecting the response you consider best describes the experience in class. Think about the work you have to do for school and respond to each statement by selecting one response.

	Mostly	Often	Some	Rarely
(a) I read or listen.	( )	( )	( )	( )
(b) I do repetitive writing, drawing or calculating tasks.	( )	( )	( )	( )
(c) I do activities to investigate the real world.	( )	( )	( )	( )
(d) I access up-to-date information for my work.	( )	( )	( )	( )
(e) I help decide how to do an activity.	( )	( )	( )	( )
(f) I work at my own pace.	( )	( )	( )	( )
(g) I do group work activities.	( )	( )	( )	( )
(h) I am assessed on the activities I do rather than just tests.	( )	( )	( )	( )
(i) I find the activities challenging.	( )	( )	( )	( )
(j) I am really interested in the activities.	( )	( )	( )	( )
(k) I find and use information about a problem or task.	( )	( )	( )	( )
(l) I analyse information to make decisions in activities.	( )	( )	( )	( )
(m) I create reports on my investigations.	( )	( )	( )	( )
(n) I am given help to learn in the best way for me.	( )	( )	( )	( )
(o) I find it easy to work and learn.	( )	( )	( )	( )

Laptop use for learning

2. Think about how you have used your laptop at school over the last term and respond to each statement by selecting one response.

	Mostly	Often	Some	Rarely
(a) I have used my laptop to help me learn basic skills.	( )	( )	( )	( )
(b) I have used word processing to produce reports.	( )	( )	( )	( )
(c) I have used graphics to improve my reports.	( )	( )	( )	( )
(d) I have used video or audio to improve my presentations.	( )	( )	( )	( )
(e) I have used spreadsheets or databases to organise information.	( )	( )	( )	( )
(f) I have used email to communicate.	( )	( )	( )	( )
(g) I have used computer programs (e.g., Clickview) to find information.	( )	( )	( )	( )
(h) I have used the Internet to find information for my work.	( )	( )	( )	( )
(i) I have used other functions.	( )	( )	( )	( )

If applicable, please list those other functions:

____

____

____

Feelings towards laptop use

3. Think about how you feel about using laptops at school and respond to each statement by selecting one response.

	Mostly	Often	Some	Rarely
(a) I am comfortable using my laptop for class work.	( )	( )	( )	( )
(b) The work I complete using my laptop is important.	( )	( )	( )	( )
(c) The activities using laptops are interesting.	( )	( )	( )	( )
(d) Using a laptop allows me to tackle complicated activities.	( )	( )	( )	( )
(e) I make an effort to complete activities involving my laptop.	( )	( )	( )	( )
(f) I make sure I am at school when we are working on activities using a laptop.	( )	( )	( )	( )
(g) I am given a choice to use a laptop for school work.	( )	( )	( )	( )
(h) I use a laptop outside of school	( )	( )	( )	( )

Frequency of laptop use

4. Estimate the amount of time in minutes you spent using your laptop at school on each day last week.

Day	Less than 30 minutes	30 minutes	1 hour	2 - 3 hours	More than 3 hours
Monday	( )	( )	( )	( )	( )
Tuesday	( )	( )	( )	( )	( )
Wednesday	( )	( )	( )	( )	( )
Thursday	( )	( )	( )	( )	( )
Friday	( )	( )	( )	( )	( )

Feelings towards laptop use

5. Do you have any difficulties in using your laptop?

( ) Yes

( ) No

6. If you selected yes, please explain.

7. Is there something you really enjoy about using your laptop?

( ) Yes

( ) No

8. If you selected yes, please explain.

____

____

9. Is there something you would like to know more about when using a laptop?

( ) Yes

( ) No

10. If you selected yes, please explain.

____

____

ICT competencies

11. Please rate yourself on your skill level in using each of these types of software and equipment. For each row select the answer that best describes your skills.

(a) Word processor

( ) Can't do much.

( ) Can format a document, change fonts, spell check, insert text, add footer and page numbers.

( ) Can insert images, create tables, change page setup, change margins.

( ) Use columns and sections, set up styles, use mail merge

(b) Spreadsheets

( ) Can't do much.

( ) Can enter data, use sort, create charts [graphs] and modify them.

( ) Can insert some calculations, format cells, insert and delete rows and columns.

( ) Can use complex formulae, use absolute and relative cell references.

(c) Slideshow software

( ) Can't do much.

( ) Can create a slideshow, insert images, change font and layout.

( ) Can navigate during a presentation, add animation and transitions, insert hyperlinks.

( ) Can create a master slide, include sound, print handouts, add navigation buttons.

(d) Email

( ) Can't do much.

( ) Can create, send and access emails, add to and access address book entries.

( ) Can store messages in folders, locate sent and deleted messages, manage address book.

( ) Can add a signature, add attachments, set up and send a group email, apply rules to manage emails.

(e) Computer file management

( ) Can't do much.

( ) Can save files in a folder, create and name folders, navigate between folders, copy, delete and rename files.

( ) Can recognise different file types, navigate between drives and directories access a network, use help files.

( ) Can zip and unzip files, install software

(f) The Internet

( ) Can't do much.

( ) Can navigate to known web sites, create favourites, do basic searches.

( ) Can save images and text, use advanced search tools, organise favourites.

( ) Can conduct complex searches, download and install software, use different browsers, alter browser preferences.

(g) Web page authoring

( ) Can't do much.

( ) Can create pages and links, insert and format text, insert images.

( ) Can use tables, create external links and email links.

( ) Can create a website with pages and folders, insert sound, upload files to the web.

(h) Digital photography

( ) Can't do much.

( ) Can take photos or video and use on a computer.

( ) Can edit images / video on camera, adjust basic camera settings (e.g., flash, red-eye, zoom).

( ) Can edit and modify images, crop, adjust shadows, exposure, contrast and edit resolution. Adjust camera settings considering environment and purpose.

(i) Image editing

( ) Can't do much.

( ) Can do simple editing such as crop, delete and draw.

( ) Can change image size, format and resolution.

( ) Can undertake complex image manipulation using special effects.

(j) Video editing/podcasting/movie making

( ) Can't do much.

( ) Can do simple editing such as a crop, delete and insert.

( ) Can use basic software to introduce transitions, import and edit sound track, add titles and subtitles.

( ) Can use advanced software to apply complex editing and special effects.

(k) Blogs and wikis

( ) Can't do much.
( ) Contributes to wikis and writes a blog.
( ) Make comments on other blogs, create own wiki.
( ) Go to other wikis and enhance the quality of the wiki for an audience. Organise an ongoing series of blogs.

Comments

12. List the software you use the most.

____

____

13. Do you have any other comments?

____

____

Thank You! Thank you for taking part in this questionnaire. Your response is very important.

Inception Teacher Questionnaire: First Year

This inception survey questionnaire is aimed at finding out as much information about how you engage technology for educational purposes.

Please take your time to complete this questionnaire to the best of your ability.

It should take between 20 - 30 minutes of your time. Thank you.

1. Years of teaching experience:

____

2. Years at present school:

____

3. Age(Select an age range)

( ) 20 - 24
( ) 25 - 29
( ) 30 - 34
( ) 35 - 39
( ) 40 - 44
( ) 45 - 49
( ) 50 - 54
( ) 55 - 59
( ) 60+

4. If you fulfil a specialist role(s) or specialise in a curriculum area(s) describe this/these:

____

____

____

5. The number of computers you usually use with your students is:

____

____

____

6. Indicate how often you have used each of the following strategies over the last 12 months.

	Often	**Sometimes**	**Rarely**	**Never**
(a) Each student uses a computer in a laboratory...	( )	( )	( )	( )
(b) Each student uses a computer in the classroom...	( )	( )	( )	( )
(c) Students work in pairs in a laboratory...	( )	( )	( )	( )
(d) Students work in pairs in the classroom...	( )	( )	( )	( )
(e) Students work in groups...	( )	( )	( )	( )
(f) Students are rostered onto a computer...	( )	( )	( )	( )
(g) Students use computers at outside class time...	( )	( )	( )	( )
(h) Students may use a computer when available...	( )	( )	( )	( )
(i) Each student has a computer in the classroom...	( )	( )	( )	( )
(j) Other...	( )	( )	( )	( )

7. If you selected other please explain your answer:

8. Consider the pattern to your ICT use with students. Select your response to each item.
For how many years have you been regularly using computers in your classrooms with students (averaging at least once a week)?

Don't use 1 or 2 years 3 or 4 years > 4 years

9. Would you like to make more use of computers with your students?
( ) Yes
( ) No

10. If you selected yes, please explain.

____

____

____

11. How often have you used computers with students?
( ) Daily
( ) Weekly
( ) Fortnightly
( ) Rarely

12. How often have you used computers to support group-work?

( ) Daily

( ) Weekly

( ) Fortnightly

( ) Rarely

13. How often was using computers with your students effective?

( ) Daily

( ) Weekly

( ) Fortnightly

( ) Rarely

14. What proportion of time would you like to see students using computers in your classes?

( ) < 10%

( ) 10 - 25%

( ) 25 - 50%

( ) 50 - 75%

( ) > 75%

15. Which of the following statements best sums up your view of how the use of computers connects with student learning for your situation (choose one).

( ) (a) Students need to learn about computers and how to use them.

( ) (b) Computers are useful to complete specific learning tasks.

( ) (c) Computers provide a set of technologies to support learning processes.

( ) (d) The use of computers will improve the classroom learning environment.

16. In what way does the use of computers by your students demonstrate the curriculum understandings/skills specific to your learning area(s)?

____

____

____

17. By students engaging in a set of learning activities that use a computer, this is likely to..(choose one response for each)

	Strongly Agree	**Agree**	**Disagree**	**Strongly disagree**
(a) Lead to better understanding of curriculum content.	( )	( )	( )	( )
(b) Help students think in different and more interesting ways.	( )	( )	( )	( )
(c) Be a faster way of learning.	( )	( )	( )	( )
(d) Lead to students helping each other.	( )	( )	( )	( )
(e) Lead to a better use of the teacher's time.	( )	( )	( )	( )
(f) Lead to students completing more work.	( )	( )	( )	( )
(g) Motivate students to enjoy learning.	( )	( )	( )	( )

18. How do you contribute to your school's or learning area's ICT planning?

____

____

____

19. What would you like to contribute?

____

____

____

20. What types of learning activities have you used computers for with students over the past year? (Choose one for each)

Computers are used to:	Often	Sometimes	Rarely	Never
(a) show a concept....	( )	( )	( )	( )
(b) make a product....	( )	( )	( )	( )
(c) provide a problem....	( )	( )	( )	( )
(d) store information....	( )	( )	( )	( )
(e) access information....	( )	( )	( )	( )
(f) simulate an environment or action....	( )	( )	( )	( )
(g) analyse information (e.g., statistics, graphs)....	( )	( )	( )	( )
(h) develop a skill (e.g., typing, tables)....	( )	( )	( )	( )
(i) present information (e.g., publishing, slideshows)....	( )	( )	( )	( )
(j) type assignment (e.g., word processing)....	( )	( )	( )	( )
(k) other....	( )	( )	( )	( )

21. Please specify your other in question 8 (k).

____

22. Do you think that computers can be used to improve student learning with your class(es)?

( ) Yes
( ) No
( ) Not sure

23. Why? Please explain

____

____

____

24. To what particular learning activities have students applied computers during the last term?

____

____

25. What are the main purposes you want to use ICT for with your students?

____

____

26. What added value do you expect for your students by using computers?

27. How do you decide whether to use computers to support student learning?

28. What ways are students permitted to contribute to decisions about the use of computers?

29. What would you like to use computers for with your classes that you do not do at present?

30. Explain the extent to which the work students complete using computers contributes to your overall assessment process.

31. What do you see as your main roles when using computers with your classes?

32. What roles do the students have?

33. Describe support you receive from others in using computers to support student learning.

---

34. What support do your students have in their use of computers?

---

35. Consider the skills and knowledge you have in using computers and what steps you have taken to develop the skills and knowledge you need.

(a) Circle the expression that best represents your knowledge and use of computers:

( ) non user

( ) novice

( ) intermediate user

( ) experienced user

36. How do you feel when you support your students in using computers? (Choose any relevant)

( ) comfortable

( ) unsure

( ) excited

( ) proud

( ) nervous

( ) confident

37. When did you last receive formal training about using computers (write the year)

Through school: What year and course?

---

38. At University: What year and course?

---

39. At other courses: What year and course?

____

____

____

40. Are you a part of an on-line learning community (e.g., EDNA Education Network Australia)
( ) Yes
( ) No

41. If yes, please list which learning community:

____

____

____

42. Which of the following factors prevent you from effectively using computers with students (choose all relevant)

( ) (a) It is difficult to get access to one computer

( ) (b) It is difficult to get access to a computer laboratory

( ) (c) I am not confident in using a computer

( ) (d) My students do not know how to use computers

( ) (e) The computer is not relevant to what the students do

( ) (f) There is no useful software available

( ) (g) The computer is not suitable for the students to use

( ) (h) The computer is not suitable for me to use

( ) (i) Using a computer uses too much time and effort

( ) (j) Any other factor (describe below)

43. Describe the other factor:

____

____

____

44. How often do you use the following software types with your students?

	Daily	Weekly	Monthly	Rarely
(a) Drill and practice (e.g., Mathletics)	( )	( )	( )	( )
(b) Tutorial (i.e. teaches specific content)	( )	( )	( )	( )
(c) Simulation (e.g., News maker)	( )	( )	( )	( )
(d) Tool-based (e.g., spreadsheet)	( )	( )	( )	( )
(e) Resource based (e.g., Clickview)	( )	( )	( )	( )

45. List the names of the software packages you have used in the last term.

____

____

____

46. Do you have a favourite software package at the moment?

( ) Yes

( ) No

47. If yes, please explain.

____

____

____

48. Do you have a favourite website at the moment?

( ) Yes

( ) No

49. If yes, please explain.

____

____

50. Do you have any other comments?

____

____

Thank You! Thank you for taking part in this questionnaire. Your response is very important.

Inception Parent Questionnaire: First Year

This questionnaire is anonymous. It should take between 5 - 10 minutes. Please complete the following questions.

Year level your son is in:

( ) Year 5
( ) Year 7

Laptop use at school

1. To what degree do you think that laptops are used at your son's school?

( ) Very little
( ) Not enough
( ) The correct amount
( ) Too much

Frequency of laptop use

2. Estimate the amount of time you think your child spends at home using a laptop for schoolwork.

( ) Less than 1 hour a week
( ) 1 hour a week
( ) 1 hour a day
( ) More than 1 hour a day

Laptop competencies

3. Rate your child's ability with using a laptop.

( ) Very poor
( ) Not very good
( ) Quite good
( ) Good enough
( ) Very good

Laptop use at school

4. Are there any ways in which you would like to see the school use laptops?

( ) Yes
( ) No

If yes, please explain.

Student learning

5. To what extent do you agree with each of the following statements about your son's education at the school at the moment?

Statements	Strong agree	Agree	Don't know	Disagree	Strong disagree
(a) My son usually learns about things in the real world.	( )	( )	( )	( )	( )
(b) My son is often encouraged at school to think about information and come to his own conclusions.	( )	( )	( )	( )	( )
(c) My son is often learning by doing practical things at school.	( )	( )	( )	( )	( )
(d) My son is usually assessed on the work they do rather than by tests and exams.	( )	( )	( )	( )	( )
(e) Work that my son produces using a laptop is assessed.	( )	( )	( )	( )	( )
(f) My son is very involved in work at school.	( )	( )	( )	( )	( )
(g) My son is usually motivated by work at school.	( )	( )	( )	( )	( )
(h) My son is usually challenged by work at school.	( )	( )	( )	( )	( )
(i) Laptops are used at school to help my son to do work faster, more accurately or better in some ways.	( )	( )	( )	( )	( )
(j) My son is helped at school to think deeply about what is being learned.	( )	( )	( )	( )	( )
(k) My son is helped at school to analyse and interpret information.	( )	( )	( )	( )	( )
(l) My son is given independence at school to make choices about what he learns.	( )	( )	( )	( )	( )
(m) My son often seeks ideas from others at school or home.	( )	( )	( )	( )	( )
(n) My son often does work in groups in class.	( )	( )	( )	( )	( )
(o) My son often has work specially organised for him.	( )	( )	( )	( )	( )
(p) The school provides my son with plenty of opportunities to use his laptop.	( )	( )	( )	( )	( )
(q) The school gives me plenty of information about what my son is expected to do with his laptop.	( )	( )	( )	( )	( )
(r) A laptop is used at school to help overcome a physical disability that my son has. (Ignore if not relevant)	( )	( )	( )	( )	( )

Personal use of ICT

6. Choose the expression that best represents your knowledge and use of computers:

( ) non-user

( ) novice

( ) intermediate user

( ) experienced user

Comments
7. Other comments:

____

____

____

8. If you would like to take part in a small group discussion about some of the issues that will be raised by the responses to this survey please fill in your name and contact details below:

____

____

____

Thank You! Thank you for taking part in this questionnaire. Your response is very important.

APPENDIX H:
Questionnaire Matrix: Reliability Analysis

Questionnaire	Year	Theme(s)	No. of Items	Item Numbers	Cronbach's Alpha
Student	First Second Third	Laptop use for learning	27	1(a)-(m), 2(a)-(n)	0.826
		Feeling towards laptop use	11	3(a)-(h), 5, 6, 7	0.701
		ICT competencies	11	8(a)-(k)	0.851
		Impact on learning	4	10, 11, 12, 13	0.615
		Laptop use at home	8	14(a)-(h)	0.690
		Mobile phone use	10	15, 16(a)-(j)	0.902
		Social media	19	17(1)-(6), 18(1)-(13)	0.673
Teacher	Second Third	Laptop use for learning	9	1 - 9	0.927
		Frequency of laptop use	10	11(a)-(e), 12(a)-(e)	0.945
		ICT competencies	11	16(a)-(k)	0.851
		Laptop use for pers./prof. use	8	18(a)-(h)	0.577
		Impact on learning	6	21 - 26	0.616
Parent	Second Third	Student learning	20	5(a)-(y)	0.888
		Impact on learning	4	12 - 15	0.802

Notes:

1. The Table summarises the results of the Reliability Analysis performed on each of the three Questionnaires: Student, Teacher and Parent.
2. The analysis was applied to each of the multiple-Item Themes that are amenable to this type of analysis.
3. The Student Questionnaire did not change from the First to the Third year of the study. Therefore, the Cronbach's Alpha results in the table were yielded by applying Reliability Analysis to the pooled data from all three years and both Cohorts A and B.
4. The Teacher Questionnaire changed between the First and Second years of the study with the addition of several items. Therefore, the Cronbach's Alpha results in the table were yielded by applying Reliability Analysis to the pooled data from the Second and Third years only.
5. The Parent Questionnaire changed between the First and Second years of the study with the addition of several items. Therefore, the Cronbach's Alpha results in the table were yielded by applying Reliability Analysis to the pooled data from the Second and Third years only.

APPENDIX I:
Annual Parent Focus Group

Implementation

1. How has the implementation of the laptop program impacted on your son's learning?

Laptop use/support

1. How often does your son use his laptop at home each day?
2. What type of activities does your son use his laptop for at home?
3. At home how involved in school work is your son?
4. What support does your son have in the use of his laptop?
5. Is there adequate provision of support by the College?

Learning

1. What is the value in having your son use a laptop?
2. Is your son challenged with the use of laptops and learning?
3. Is there enough opportunity at school to use the laptop?
4. Describe your son's focus since the onset of the laptop implementation?
5. Over the last 12 months what have you noticed about your son's learning?
6. Has there been an impact on your son's educational learning?
7. Could you describe his motivational level with reference to the laptop program?

Parental involvement / views / monitoring

1. In what ways do you connect with your son and his learning?
2. How important is the use of computers for your son?
3. Is your son becoming more of an independent learner with the use of a laptop?
4. Describe the support you receive from others in the implementation of computer support for learning?
5. Could you please explain your level of involvement / do you feel alienated in the implementation of the laptop program?
6. What are views of parental controls and the monitoring of your son?

APPENDIX J:
Gaming Forum

1. From the responses gathered from the annual survey questionnaire there was an indication that laptop were at times being used to play game? Could you explain where and when it this occurred and was it a distraction?

2. What subject(s) was the laptop useful for learning?

3. Did you think it is appropriate to play games / use applications / social media on your laptop when you were at school?

4. Did you see students use their laptops not for learning in class?

5. What type of games / applications / types of social media do you see most played on laptops?

6. Why do you think students would use these types of applications on their laptop in class?

7. Did you see students playing games on any other device?

8. Do you sometimes get sidetracked when you used your laptop whilst: At School? At home?

9. Do you sometimes skip homework in order to spend more time using the laptop?

10. Did you try to cut down on playing games? If so, were you successful?

11. Do you see a place for games for learning?

12. What is your definition of an educational computer game?

13. Do have any other feedback?

APPENDIX K:
Observation Protocol

Focus on Integrated Technology Classroom Observation Measurement (FIT:COM)

Based upon Judson's (2002) instrument.
This template was used in the research conducted by Frank Bate PhD – '**A longitudinal study of beginning teachers' pedagogical identity and their use of ICT**'

1. Background information

Name of teacher: ____

School: ______________________________________(Single sex – male)

Location (e.g., classroom, lab, other: ____________________________

Subject: ______________________ Year level: ___________________

Start time: ____________________ End time: ______________________

Date of observation: ____

Number of students: ___________________________

2. Contextual background and activities

Description of lesson

Classroom setting (e.g., space, seating arrangements etc)

3. Technology context

Number of laptops _______________ Other media _____________________

Description of the technology incorporated into the lesson including hardware and software specifications.

Amount of use (i.e. proportion of the lesson) _______________________

Kinds of use (e.g., instructional game, drill and practice, presentation, exploration, creative work, productivity tool etc)

Context for use (e.g., independently for students, in the context of the learning situation, as a reward etc)

Sketch of physical lay out of classroom (i.e. placement of technology, teacher and students; indicate mobility)

4. Design of technology integration

		Never occurred				Occurred frequently
1	The design of the technology integration allowed students to learn in ways not otherwise possible.	0	1	2	3	4
2	Technology was a means for supporting curricular objectives, as opposed to being a separate curricular focus.	0	1	2	3	4
3	The selection of the technology (hardware and software) was appropriate to meet the learning objectives.	0	1	2	3	4
4	This lesson embedded basic student operation of technology.	0	1	2	3	4
5	The integration of technology was designed to promote intellectual challenge (students pose questions, direct their own work, and assess their own work).	0	1	2	3	4
		Section score				**/20**

Comment

5. Class dynamics

		Never occurred				Occurred Frequently
6	The teacher and/or use of technology prompted students toward higher-order thinking.	0	1	2	3	4
7	Students had a voice in the selection of technology tools and how the technology was to be utilised.	0	1	2	3	4
8	Interaction with technology provided students with a sense of independent control and mastery over an environment.	0	1	2	3	4
9	The teacher provided appropriate assistance to guide student activity.	0	1	2	3	4
10	Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence.	0	1	2	3	4
		Section score				**/20**

Comment

6. Meaning and purpose

		Never occurred				Occurred Frequently
11	Connections within the content and to other content disciplines were explored and valued.	0	1	2	3	4
12	Students took pride in new learning and/or work produced with the aid of technology.	0	1	2	3	4
13	Technology was used to investigate real phenomena and real world situations.	0	1	2	3	4
14	Students developed problem solving strategies. Where appropriate, technology tools aided the development of these strategies.	0	1	2	3	4
15	Students used technology to solve problems and make informed decisions.	0	1	2	3	4
		Section score				**/20**

Comment

7. Content and knowledge

		Never occurred				Occurred Frequently
16	The lesson emphasised fundamental concepts outlined in the curriculum framework.	0	1	2	3	4
17	The integration of technology into the lesson promoted strong, coherent conceptual understanding.	0	1	2	3	4
18	The teacher had a solid grasp of the subject matter content and the use of technology.	0	1	2	3	4
19	Students were reflective about their own learning.	0	1	2	3	4
20	Students used technology to aid the construction of meaningful knowledge.	0	1	2	3	4
		Section score				**/20**

Comment

8. Technology as tools

		Never occurred			Occurred Frequently	
21	The use of technology aided the clarification and communication of ideas.	0	1	2	3	4
22	Students employed technology to develop strategies for solving problems.	0	1	2	3	4
23	Students used technology to construct models, increase productivity, and produce creative work.	0	1	2	3	4
24	Students utilised technology to collect information, process data and report results.	0	1	2	3	4
25	Students used technology for inquiry and exploration. Students made predictions, estimations and/or hypotheses and devised means for testing them.	0	1	2	3	4
		Section score				**/20**

Comment

Total score: /100