Learning with Laptops:
The impact of the ILP on
gendered primary classrooms.

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ABSTRACT

Information and Communication Technology (ICT), an increasingly pertinent aspect of society, surrounds us and requires competency in order for us to function in our world. For many years, computers have been a constant for students within a classroom environment as has been the expectation of competency. Research has demonstrated however, that gender inequalities exist in the access, use, interest and perceived/actual ability of students using computers. If equality in the technological classroom is not achieved, females may be significantly disadvantaged and disengaged.

Conducted under a qualitative framework, this longitudinal case study explored gender differences in two diverse technological environments at an Independent School in Melbourne’s southern suburbs, further examining the relationship between access, gender and student engagement. Data, in the form of interviews, surveys, observations and questionnaires, was collected from both students and their parents, and analysed with the assistance of the qualitative data analysis program QSR Nvivo8.

When analysing and comparing data collected across the two stages of this project, it was found that the Independent Laptop Program (ILP) had positive effects on students’ knowledge, usage, access and ability in computers, and enabled participants to gain new knowledge whilst being involved in the study. In addition, there was a dramatic increase in personal satisfaction, student ability, and time spent with computers. The results indicated that there had also been a change in the ways in which computers were used by each gender.

Furthermore, this study confirmed that when technical issues were encountered, students involved in this ILP were more willing to attempt to resolve the problem themselves, before asking for assistance from friends, family or teachers. These students still, however, continued to look towards men, whether at home or in the classroom, if they were unable to resolve the problem or if support was required. The results also indicated that older siblings, especially males, played a key role in influencing students with computers.
Although positive changes became evident within the results collected in this study, the gender differences evident in Stage One of the project did not diminish with the introduction of the ILP. Thus, a new model of Engagement – the Cognitive, the Volitional and the Emotional – was proposed. Each of these areas needs to be addressed in an ILP classroom, in addition to providing adequate support structures and language reinforcement, in order to provide a successful program which minimises gender difference.
DECLARATION

This is to certify that

i) the thesis comprises only my original work towards the Masters,

ii) due acknowledgement has been made in the text to all other material used,

iii) the thesis is less than 40,000 words in length, inclusive of footnotes, but exclusive of words in tables, maps, bibliographies and appendices.

Signature: __________________________

Date: __________________________
There are many people whom I need to thank for their support during the past few years.

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CHAPTER 1: INTRODUCTION

Background to the Study

Information and Communications Technology (ICT) plays an increasingly significant role in our society. The current generation are constantly being “shaped by their abilities to acquire, communicate, access and manipulate information using ICT and to respond creatively to emerging technologies” (Curriculum Corporation, 2005, p. 3). As ICT is adopted by a growing majority of homes and businesses, it would be natural to expect that ICT would be incorporated into the school curriculum to provide children with the necessary skills to use this ability in everyday life.

Currently, educators, government bodies, policy makers and researchers agree on the potential of ICT to have a significant and positive impact on education. The issue with this accord however, is how to make an integrated ICT curriculum that is able to cater for a wide range of users with different interests and abilities. Gender inequality, among other issues such as economical issues and teacher training, is a major impediment in achieving this goal (Plumm, 2008).

Over a decade ago, a significant study by Littleton (1996) identified that negative cultural connotations, lack of accessibility and opportunities to develop skills both inside and outside school existed for girls, culminating in an overall concern for the disengagement of females in ICT against a backdrop of an increased use of computers across the curriculum. Since then numerous studies have further examined these issues, focusing research on specific attributes of feminine disengagement including home computer usage (Downes, 1998), gender inequalities with regard to computer use (Mackereth & Anderson, 2000), gender perceptions of computer use (Hargittai & Shafer, 2006), gender differences in participation and performance (Volman, van-Eck, Heemskerk, & Kuiper, 2005), and female experiences in multiple-faceted settings (Burke & Murphy, 2006). Considering the meta-analyses of results of the research discussed above, it appears that boys, as opposed to girls, demonstrated more interest in ICT (Gansmo, 2003), were heavier users of (Craig, 2005), and had a more positive attitude towards computers (Colley & Comber, 2003). Although some results indicated a diminishing difference in areas such as the use of specific
computer applications (Colley & Comber, 2003) and access (Markauskaite, 2006) these findings draw parallels to those presented in Littleton’s study (1996) where the overall pattern in results indicated gender discrepancies in children’s engagement with computers.

Research shows a significant correlation between high levels of engagement and improved attendance and achievement (Lindsay & Lewis, 2000; Marks, 2000). As student engagement is an essential aspect of student learning (Jablon & Wilkinson, 2006), with the increased prevalence of ICT in primary classrooms we need to determine if all children are being engaged equally with this powerful medium. In addition, when examining previous research, many studies indicate that gender discrepancies in educational settings occur as a result of limited access to ICT (Burke & Murphy, 2006; Redmond, 2006), which raises the question of whether providing equal access would have a positive impact on gender differences.

**Rationale for the Study**

Thus this study explores gender differences in two diverse technological environments, a classroom with four desktop computers and another environment that employs the Individual Laptop Program (ILP), to further examine the relationship between access, gender differences and student engagement.

The importance of this research is that few studies have examined these two technological environments, with the aim of discovering whether the laptop program makes an impact on student engagement with computers. The findings of this project aim to support current research, which shows that gender difference has decreased when students have equal access to computers (Chalmers & Price, 2000). In addition, the findings will provide classroom teachers with greater insight into the best ways to implement the ILP in the classroom so that access and engagement are equal for all students.

**Research Interest**

My interest in researching the ILP comes directly from my own personal experience throughout my childhood. David Loader (1997, 2004), who worked closely with Gary Stager (2002a, 2006), implemented an ILP in the early 1990’s at the school I
attended and this program has played a significant role in where I am today. Other students who came through the program, however, do not appear to have been as engaged, nor derived the same value I believe I have gained from the implementation of this program. Thus, I am interested in looking at the impact of the ILP today and observing whether the implementation and execution equally engage both genders.

My teaching experience with the ILP enables me to bring a teacher’s perspective and insight into the research. Although I already know some of the ways by which students best learn and engage with computers as well as some of the elements needed in order to bring success with this medium, I am interested in extending this knowledge. In addition, sharing with colleagues any further insight which may be gained into the ways in which students best engage with laptop computers will help to ensure that this initiative is beneficial for all involved.

**Research Question**

This study therefore seeks to answer the following question:

- What impact does the laptop computer program have on gender differences with engagement in the primary classroom?

This question needs to be addressed to ensure that both genders are able to fully engage with ICT, the powerful and pervasive medium that is shaping modern society.

**Definitions of the Key Terms**

For the purposes of this study “engagement”, as established by Marks (2000) and supported by the findings of Jablon and Wilkinson (2006), denotes a learner’s intrinsic motivation in terms of personal achievement, interest and enjoyment. As this study aims to investigate the differences in engagement of children in the primary classroom with ICT, engagement will be examined through a range of data collection processes that gauge personal achievement, interest and enjoyment.

**Study Design**

Conducted under a qualitative case study framework, this research project was designed to examine a small group of students over a six month time frame. The
study focused on one ‘case’, encompassing 11 boys and seven girls, at an Independent School in Melbourne’s southern suburbs.

At the beginning of the study the students had some experience with computers, and had access to the four classroom computers in addition to any incidental use they may have had at home. Shortly after the first stage of data collection, the students received an individual laptop. Six months later participants underwent the second and final stage of data collection. During data collection, participants answered surveys, were observed completing certain computer based tasks, and took part in semi-structured interviews. Parents of the participants also completed questionnaires. Data was coded and summarised into themes using the qualitative data analysis software QSR Nvivo8. The research question and related issues will be addressed by reference to emergent themes identified through an analysis of data, in light of the literature.

**Structure of the Thesis**

There are six chapters which are outlined as follows:

**Chapter 1: Introduction**

The Introduction provides an overview and begins to give an insight into the thesis. This chapter highlights the important question that the research is attempting to answer as well as describing the underlying motivation for the research and defining any key terms.

**Chapter 2: Literature Review**

The Literature Review provides background information required to contextualise the study and highlights the significance of the research. In addition, this chapter draws attention to similar studies that have been conducted and discusses various methodological approaches and methods used in this research.

**Chapter 3: Methodology**

Methodology “is a branch of knowledge that deals with method and its application in a particular field of study” (Evans & Gruba, 2002, p. 89). This chapter examines the Case Study Methodology utilised in this study, its methods, any limitations and the ethical considerations of the study.
Chapter 4: Research Findings and Analysis

Research Findings and Analysis presents the results from the parents’ surveys, student questionnaires, ability observations, and interviews. These findings have been grouped into three major themes: New Technology, Student Opinions, and External Factors. This chapter begins the initial stages of analysis which introduces new themes for discussion.

Chapter 5: Discussion

In Chapter 5, the research question is addressed in relation to the themes which have emerged from the analysis of the findings. The new findings are discussed in relation to the literature that was presented in Chapter 2: Literature Review.

Chapter 6: Conclusion

In the final chapter, significant information in the thesis is re-addressed. The research question is restated and a final response is provided. In addition, the methodology is questioned, with comments given towards the benefits and limitations of this study. Whilst recommendations for classroom practice are made, suggestions for further research in the field are also provided.
CHAPTER 2: LITERATURE REVIEW

Introduction

Technology is becoming increasingly prevalent in our everyday lives (Dix, 2005). In education, computers are becoming an indispensable aspect of learning (Markauskaite, 2006). The acknowledgement of the widespread influence of technology comes hand in hand with the expectation of computer competence (Bain & Rice, 2006; Redmond, 2006; Hollingworth, Allen, Hutchings, Kuyok, & Williams, 2008; MCEETYA, 2008, cited by Meiers, 2009).

Impact of Technology on Society

Over recent decades, technological opportunities have been more limited for girls than boys (Murphy & Gipps, 1996; Young, 2000; Department of Education Science and Training, 2005). All forms of technology have been seen to be biased towards males, disengaging females from participating in ICT related activities (Harding, 1996; Gansmo, 2003; Stewart, 2004; Burke & Murphy, 2006). As a result, the technology field has emerged in research activities (Harding, 1996; Gansmo, 2003; Stewart, 2004; Burke & Murphy, 2006) as the most strongly gender stereotyped domain (Harding, 1996).

Research suggests there is widespread concern about the gender differences in ICT evident within society (Littleton, 1996; Chalmers & Price, 2000; Colley & Comber, 2003; Craig, 2005; Bain & Rice, 2006; Hargittai & Shafer, 2006; BECTA, 2008a). This research suggests that inequality stems from a range of issues including diverse ability levels (Department of Education Science and Training, 2002; Colley & Comber, 2003; Craig, 2005; Department of Education Science and Training, 2005; Mitchell, 2006), lack of interest (Littleton, 1996; Gansmo, 2003; Leech, 2007), lack of participation or access (Murphy & Gipps, 1996; Chalmers & Price, 2000; Craig, 2005), stereotypical images apparent within society (Downes, 1998; Stewart, 2004), and the attitudes held towards technology (Volman & van Eck, 2001; Colley & Comber, 2003; Volman et al., 2005; Burke & Murphy, 2006; Hargittai & Shafer, 2006). With the increasing deployment of computers in schools (Colley & Comber, 2003) recognition of these issues is pertinent, as is the resulting action necessary,
otherwise girls could be placed at a serious disadvantage if these gender images and attitudes remain unaffected (Chalmers & Price, 2000; Craig, 2005).

As computers are readily becoming a significant part of our everyday lives (Meiers, 2009), research recognises the important role that schools have in addressing these issues and ensuring education is inclusive for all students (Murphy & Gipps, 1996; Gansmo, 2003; BECTA, 2008a; Cranmer, Potter, & Selwyn, 2008; Hollingworth et al., 2008). In one study, Meiers (2009) made strong claims that “ICT improves students’ engagement” and that “ICT...has a positive impact in primary school” (Meiers, 2009, p. 12), but the research lacked supporting evidence. Thus, despite the increased awareness and understanding research such as this has produced, female disengagement in relation to interest, use and attitudes towards computing continue to exist (Chalmers & Price, 2000; Gansmo, 2003). Isolated from equal access to computers, women are continually disadvantaged in the field and continue to be disengaged with technology (Burke & Murphy, 2006). As Chalmers and Price (2000, p. 14) said “girls observe the association between males and computers and decide that they don’t belong”.

This pertinent issue of equality in the teaching and learning of ICT needs to be addressed, especially in primary schools (Cranmer et al., 2008), with the aim of achieving gradual inclusion of all pupils, especially girls, in order to become competent ICT users (Gansmo, 2003).

**Attitudes held towards Technology**

According to Sanders (2005), the attitudes people have toward technology is one of the most researched topics in relation to ICT. As attitudes about computers tend to develop at an early age (Chalmers & Price, 2000; Redmond, 2006), it is important that each gender develops a positive perspective towards technology and about their ability to use technology in the early stages of life (Redmond, 2006).

Multiple studies, including Bain and Rice (2006) and Meelissen and Drent (2007), state that both girls and boys have a positive perspective towards using computers. A Dutch study, conducted by Meelissen and Drent (2007), in addition to Sanders (2005) and Bunz, Curry, and Voon (2007) found that, although both genders have positive
attitudes, boys appear to have a more optimistic outlook towards computers. Hargittai and Shafer (2006), whilst agreeing with Sanders (2005), Bunz et al. (2007) and Meelissen and Drent (2007), also discovered that women’s attitudes appear to discourage usage. They found that “gendered attitudes are central to discrepancies in use” (Hargittai & Shafer, 2006, p. 436), thus if females have a poor attitude toward computers, their usage level will be equivalently low.

Li and Kirkup (2005) also draw parallels to the findings of Sanders (2005), Hargittai and Shafer (2006), Bunz et al. (2007) and Meelissen and Drent (2007). Although Li and Kirkup’s study (2005) was based in a higher education setting, the research still indicates that women have a less positive attitude towards computers in comparison to men. This study also found that females are more anxious about using computers (Li & Kirkup, 2005).

In a large longitudinal study conducted in nine South Australian schools, Dix (2005) examined whether ICT can change student attitudes. The findings showed that over time, boys self esteem towards computers increased with age whilst the reverse occurred for girls (Dix, 2005). Once again, although Dix (2005) discovered a decline in interest over the time frame of the study for females, the research still supported the findings of Sanders (2005), Hargittai and Shafer (2006), Bunz, Curry and Voon (2007), and Meelissen and Drent (2007) in relation to the male counterparts.

In the hope of determining the reasons behind Leech’s (2007) finding, a study by Timms, Courtney and Anderson (2006) was conducted with the aim of understanding the way in which females perceive ICT subjects and courses. In this mixed method study, participants, who were only secondary school female students, perceived the advanced ICT subjects to be uninteresting and irrelevant (Timms et al., 2006). Similarly, Leech (2007) found that girls saw computers as boring. Although Leech (2007) did not elaborate on this statement, she did say that females are deterred from participating in formal ICT studies. Further analysis is required to completely understand the reasons behind this perception.

It appears that the general trend, whether through observing individual changes in attitudes or longitudinal differences in attitudes as a whole group, is that girls’ interest
levels in ICT decrease over time. Additional research needs to be conducted to help establish the specific reasons why girls’ attitudes negatively change over time.

**Motivation and Enjoyment in ICT**

Similarly to students’ attitudes, comprehensive research has been conducted about students’ motivation and enjoyment levels when using ICT. In a report encompassing a wide range of sources, BECTA (2008a) stated that motivation increases for both genders with the use of ICT. Despite this, there is a greater difference in motivation for boys (BECTA, 2008a). Hollingworth et al. (2008) agreed with this finding, stating that the visual, interactive nature of ICT increases motivation. In addition, this study found that technology proved extremely effective in engaging boys in learning (Hollingworth et al., 2008).

A large longitudinal study was conducted in England to determine the motivational effect of ICT on pupils (Passey, Rogers, Machell, McHugh, & Allaway, 2003). This mixed methods study was based on an interesting framework for motivation which discovered that at primary level intrinsic motivation was high. Children who were interviewed stated that ICT makes learning more interesting (Passey et al., 2003), therefore making connections with BECTA (2008a) and Hollingworth et al. (2008).

Analogous to BECTA (2008a) and Hollingworth et al. (2008), the study by Passey et al. (2003) found that, although ICT has motivational effects on both genders, there is a greater difference with boys. It is important to note that these researchers found that, although boys measured higher on the motivation scale, girls were not disadvantaged.

A perspective not often seen in many of the other studies analysed was that this English study also included the teachers’ point of view. Teachers involved said that students who used computers were more engaged, focused, and were able to stay on tasks for a longer period of time (Passey et al., 2003).

Another perspective, which surfaced in the research by Hollingworth et al. (2008), stated that the teachers interviewed disagreed with the statement that boys are more interested than girls. Although the findings discussed in this paper disagree with the
teachers’ perspectives from Passey et al. (2003), the Hollingworth et al. (2008) ideas could be easily dismissed as they fail to explain or discuss the reason for these responses, thus leaving scope for the soundness of the research to be questioned.

Conversely to the findings of Hollingworth et al. (2008), in a large mixed method study (Cranmer et al., 2008), it was found that students have little interest for ICT if it is used in formal education. In addition, Leech (2007) found that girls are not interested in ICT unless the computers are utilised for a wide range of creative activities outside of formal education. Despite this finding, it would appear that overall ICT use increases motivation and interest for most students.

**Girls**

When looking at motivation and enjoyment specifically in relation to females, studies conducted with school-aged children have found that, as girls increase in age, their interest and self efficacy in ICT decreases (BECTA, 2008a; Meelissen & Drent, 2007).

A large scale study conducted by a Victorian Organisation, ACER (Shears, 1995) who examined late secondary students’ perceptions of advanced ICT subjects found that a single sex environment proved to be effective and interesting for girls and ICT learning. The girls expressed that they felt supported and that the learning was tailored to their needs (Shears, 1995; Timms et al., 2006).

In addition to these findings, the girls involved in the Timms et al. study (2006) felt that boys were more enthusiastic than girls about computers earlier in life. Furthermore, even though the single sex environment has been proved to be effective for girls and ICT learning, the participants still found that computers were mechanical and preferred having the social interaction with people (Timms et al., 2006).

Moreover, this study found that most participants thought ICT subjects were boring. However, personally I felt that this term became a label used by the researchers without substantiated evidence to explain it (Timms et al., 2006).
**Boys**

Very simply, and consistently, the conclusion from studies around the world is that the use of ICT can motivate boys (Wilkes, 2006; Meelissen & Drent, 2007; BECTA, 2008a). Although Meelissen and Drent (2007) found that girls’ interest levels decrease, boys stay at the same level throughout their schooling.

**Activities**

Redmond (2006) examined the activities on computers that were of particular interest to each gender when using computers. Female interests included talking on chat rooms, browsing online magazines and shopping online. Boys, on the other hand, found interest in playing games on the computer. This was a consistent finding across several other studies (Li & Kirkup, 2005; Bain & Rice, 2006; BECTA, 2008a).

Furthermore, BECTA (2008a) created a discussion in its report and drew parallels with other articles by stating that games were uninteresting for girls, especially because they were marketed towards boys.

**Considerations**

Meelissen and Drent (2007) highlighted an interesting point in their study, that ICT attitudes can be influenced not only by the technology itself but also by the subject in which the technology is being used. An example they used was if ICT is being used during maths and a student already has a negative attitude towards maths, it will be challenging for them to fully engage with this class, and the ICT could even make their interest level worse (Meelissen & Drent, 2007).

In summary, the research reviewed for this study indicates that boys are more interested and have more motivation to use computers for longer than girls. In addition, both genders have diverse interests when using computers. This should be taken into consideration by education to help ensure that both genders have high levels of interest in ICT.

**Ability/Skills related to ICT**

One of the most important aspects researched in relation to gender equality is participants’ perceived and actual ability.
Perceived and Actual Ability

One significant finding akin with studies over the last decade is student perceptions of their own ability. Littleton (1996), Li and Kirkup (2005), Hargittai and Shafer (2006), Redmond (2006), Timms et al. (2006) and Meelissen and Drent (2007) all agree that women underestimate their ICT ability. In addition, Timms et al. (2006) found that girls’ perceptions of their own ability turned them off using computers as they felt inadequate users of ICT, even if their actual ability did not align with these feelings.

When examining the relationship between perceived ability and actual ability with computers, a small USA study involving University students and employees found that there was no actual significant difference in participants’ ability, although women’s perceptions of their ability were dramatically different to males (Hargittai & Shafer, 2006). Other studies (Bunz et al., 2007; BECTA, 2008a) reiterated this finding, with one study stating that some of the girls involved in the study had a superior ICT ability in comparison to boys (BECTA, 2008a).

A potential flaw in the methodological approach of Hargittai and Shafer (2006) could explain the finding discussed above, in which they found no significant differences in each gender’s ability. This research team gave participants an unlimited amount of time to complete the work and gave them continual encouragement to keep trying, even if the participants felt they were incompetent (Hargittai & Shafer, 2006).

In contradiction to Hargittai and Shafer (2006), a longitudinal study (Dunleavy & Heinecke, 2007) about the impact of an Independent Laptop Program (ILP) against mathematics and science test scores found that, although girls had similar access to computers, they did not show mastery of the content. It could be argued that this is due to girls’ inadequate ability with computers, rather than with the mathematics and science content, as these tests found that girls used computers in less sophisticated ways than boys. Because this study highlighted gender difference as a major finding, possible suggestions were given to direct further studies in the area to determine the reasons behind this (Dunleavy & Heinecke, 2007).
Following on from the Dunleavy and Heinecke study (2007), technology has been incorporated into school settings with the overall aim of increasing the learning potential and attainment for students. In a mixed method study conducted in 2008 (Hollingworth et al.) however, there was no direct link found between the use of ICT and increasing student attainment levels. Nevertheless the study found that students’ self esteem, engagement and interest in learning increased. This finding was echoed in the Cranmer et al. study (2008) where most students felt that ICT would improve their learning outcomes. The reasons behind these students’ beliefs were not elaborated on, which could be construed as a flaw in the study.

Redmond’s study (2006) provided an interesting perspective on the relationship between perceived and actual ability when different genders are working with computers. She said that if an issue arises when students work with computers, males blame technology whereas girls blame their own incompetence (Redmond, 2006). In another mixed method study (Bain & Rice, 2006), teachers believed that girls relied on more assistance than boys. This is similar to BECTA (2008a) who made the statement that girls rely on schools to teach them how to use computers.

When standing back and reflecting on these findings about perceived and actual ability, as women are dubious about their competence, they may not want to make use of the opportunities offered by ICT. Thus once again, males will have the upper hand over females (Hargittai & Shafer, 2006).

Confidence with Computers

In the field of ICT and gender research, many studies from around the globe have found that males have higher levels of confidence in comparison to their female counterparts, irrespective of their skill level (Sanders, 2005; Bain & Rice, 2006; Wilkes, 2006; Bunz et al., 2007; BECTA, 2008a). Furthermore, Sanders (2005) found that the more experience females had, the less confident they became about their skills.

Hargittai and Shafer (2006), although agreeing with the findings above, went further than these other studies on this issue and put forward one possible reason for this difference. They suggested that males think they are very capable with computers,
but women do not and so this perception affects their confidence levels (Hargittai & Shafer, 2006). Leech (2007) concurred with this research, stating “Sometimes they [girls] see that boys are really good at IT and they just think ‘Oh, I’m not going to be that good’” (Leech, 2007, p. 10).

In contrast to the studies just mentioned, a small study involving first year trainee teachers which based the analysis on the self assessment research theory, found that males are more confident than females, only in some computing areas, but specifically in the area of technical ICT capabilities (Markauskaite, 2006).

In another small Canadian study, Burke and Murphy (2006) found that, by providing opportunities for girls to work in a single sex environment, they became more confident and so their participation levels increased and they became more immersed in the computer tasks. Respondents in this study said that, in the mixed gender setting, they felt fearful of being teased or being wrong. It would be interesting to see whether this feeling or perception is true across the other studies mentioned above.

Although Burke and Murphy (2006) achieved positive results, as a researcher, it is important to question the validity of their study. The students were in a single sex high school environment at the time and were asked to compare their experience against their memories of a mixed gender primary school experience. This created a wide range of variables that needed to and should have been accounted for, and thus generated doubt about the robustness of the results.

In a small study conducted in England, Fitzpatrick and Hardman (2000) looked at single sex and mixed sex interactions with computers. In contrast to Burke and Murphy (2006), however, this work was very clear and thorough in its methodology, even highlighting and taking into consideration any mistakes that could be encountered throughout the research process. This study found that when students are placed in a girl-girl or boy-boy partnership both are confident. In a mixed gender partnership however, “boys use [computers] with confidence in a particularly dominating way when collaboration with girls breaks down” (Fitzpatrick & Hardman, 2000, p. 443)
One finding that contradicts those discussed above is Meiers (2009), who stated that both genders were confident, however, this was only when students were performing basic tasks.

**Participation or Access to ICT**

Access is another major concern in relation to gender equity. In their review of literature, Chalmers and Price (2000) discussed how women do not have equal access to ICT. They claimed that gender difference decreased with computer experience, and so concluded that equal access should be a priority in order to increase computer experience amongst children:

“Since gaining the benefits of information technology requires the use of information technology machinery (hardware), if a person is denied access to that machinery then the person is simultaneously denied access to the benefits that flow from it” (Chalmers & Price, 2000, P. 13).

However, the age of this work and lack of research substantiating its claim raises questions about its validity.

Studies in the 1990s and early 2000s such as Chalmers and Price (2000) found that access was inequitable, however recent research has shown that this trend is beginning to change. In a study that focused on a wide range of technological devices rather than computers alone, it was discovered that although boys have greater access to games consoles, there was no significant difference with other technological devices (Cranmer et al., 2008).

Johnson (2005) found there was a commonality between the two opposing viewpoints. The first perspective was that of a post-structural feminist, where the author used various intellectual currents to express their feminist concerns. The other, being that of a cyber-feminist, where the feminist perspective, that of gaining equal rights for females, is applied in cyber space. Irrespective of the ideology applied, both found girls and boys to have equal access to computers in the classroom environment. In her discussion, Johnson, went further, stating that although both
genders have equal access, the real issue is having “the inclination, skill, and the confidence to use computers” (Johnson, 2005, P. 12).

In her Australian discussion paper, Redmond (2006, p. 17) suggests “increased access leads to increased skill” and “experience with computers has a greater effect on student attitudes towards computing”. However her claims were based on research papers from over a decade ago, which questions their legitimacy. Unlike other authors, Redmond (2006) has gone further in her article, suggesting various systems should be put in place to address the issue of access and skill acquisition, such as ‘girls-only time’ or ‘girls-first opportunities’.

**Home Access**

Even though both genders have similar access to ICT at school, studies concerning home access show contradictory results (Wilkes, 2006; BECTA, 2008a). According to Wilkes (2006) and BECTA (2008a), females seem to be significantly disadvantaged in relation to home access. Redmond (2006) makes the claim that providing and giving females equal access at school and in the home is important, however, fails to give any explanation to support this statement.

Another BECTA study (2008b) found that 92% of children had access to a computer at home, with more females (92%) than males (88%) stating they used a laptop computer in their home environment. This study also found that “children spend most of their internet time for socialising, play and their own research rather than for formal learning and homework” (BECTA, 2008b, p. 6).

**Participation**

In comparison to home access, where most children have access and use a computer within their home environment, research surrounding participation rates show differences in participation levels between males and females. In one study (Markauskaite, 2006), although it was found that all participants had ease of access, males were still heavier users than females. As this study examined both the situational data and the longitudinal sustainability of these results, this increases the reliability of the data. Furthermore, in a large study by Timms et al. (2006) the results confirmed that girls are not participating in ICT in high school. There was however, no mention of participation rates for females in this study.
Another study conducted in Israel observed gender differences that arose between environments that are technologically diverse (Caspi, Chajut, & Saporta, 2008). Differing from other research papers that suggest women’s participation levels are slipping, this study found that women are greater participants in web-based instruction. Caspi et al. (2008) made a presumption based on this result, suggesting that this is due to women’s preference for written communication.

In the discussion paper by Leech (2007), after summarising other research papers she suggested ways to assist and increase girls participation with ICT. These included providing opportunity for girls to work collaboratively with computers, or giving them opportunities to work with ICT in single gendered sessions (Leech, 2007). These suggestions could link with Burke and Murphy’s study (2006), where they found that girls are more likely to succeed in a single sexed environment.

**Usage**

Usage is another significant aspect often examined in relation to ICT and gender. It can be separated into two different areas, time spent and common usage. These are discussed in more detail following.

**Time Spent**

When examining children’s time allocation patterns in using computers, Meelissen and Drent (2007) suggested that boys have higher usage than girls. Although the data source used for the study was from 1999, more recent studies (Volman & van Eck, 2001; Li & Kirkup, 2005; Markauskaite, 2006) show comparable results, where males used computers for more hours each week.

Similarly, the results of Hargittai and Shafer (2006) were analogous, showing that males spend more time online in comparison to females. Although this study was conducted with adults, it was interesting how authors described this difference. Their discussion illustrated that women have less time to use computers in their free time, and so the authors suggested this as a possible reason for women’s lack of familiarity in comparison to their male counterparts.
In contrast to the studies mentioned above, a small mixed method study (Bain & Rice, 2006), involving Year Six students, found that the overall time students spent using computers each week was similar across both genders. Although this contradicts most other research findings discussed in this paper, if we were to examine only the qualitative responses from Bain and Rice’s study (2006), they align with the studies by Volman and van Eck (2001), Li and Kirkup (2005), Hargittai and Shafer (2006), Markauskaite (2006) and Meelissen and Drent (2007), as they also found diversity between males and females in the time spent on computers.

Furthermore, although the overall results discussed above from Bain and Rice (2006) found that girls used computers for the same duration as boys, the method used to keep track of this time may have impacted on the outcome. This study required the students to keep a log of their time, and it is possible that girls were more diligent at keeping an accurate record than their male counterparts.

**Common Uses**

When examining the common uses of computers, Meiers (2009) found that Year Six students as a whole include the internet and communicating with friends as one of their most regular computer pastimes. More specifically by gender, various other research papers (Bain & Rice, 2006; Hargittai & Shafer, 2006; BECTA, 2008a) found that females used the computer mostly for social reasons. These studies also showed that boys used them primarily for games.

In relation to learning styles, Abbot (2006) found that girls use computers as a collaborative tool and for doing things in groups. As Bain and Rice (2006), Hargittai and Shafer (2006) and BECTA (2008a) also found, girls see computers as a way of interacting socially through writing emails and going on chat rooms (Abbot, 2006). Leech (2007), who also supported Abbot’s findings (2006), looked into learning styles and discovered that individual tasks suit males as they “often prefer to work alone on a computer problem” (Leech, 2007, p. 10).

A comparative study from China and the UK (Li & Kirkup, 2005) found that men use chat rooms more than females, a finding that contradicts articles by Bain and Rice (2006), Hargittai and Shafer (2006), Leech (2007) and BECTA (2008a). One finding
from Li and Kirkup (2005), that was reinforced by Bain and Rice (2006) and BECTA (2008a), however, was that men use games more than their female counterparts.

In a study by Cranmer et al. (2008), boys reported using computers for programming and technical applications, whereas girls used them for more creative purposes. This study, which aimed to find the voice of the child, found that both genders preferred to use computers for games or email at school, but disliked using them for writing and school work. One benefit they noticed from using games in a classroom setting was that it improved hand to eye co-ordination, mouse control and typing skills.

In her discussion paper, Leech (2007) stated that girls enjoy using computers for blogs, chat rooms, artistic purposes and web page design. At school however, they are taught how to use word processors and spreadsheets as individuals rather than the creative collaborative activities that girls prefer to use computers for (Leech, 2007).

In a quantitative observational study, Caspi et al. (2008) compared participation in class and online discussion forums. It was found that men talk in face to face discussions more than women as “men dominate class discussion” whereas women “logged in, posted and read more messages than their male counterparts.” Although contradicting the results of Li and Kirkup (2005), these findings support those by Leech (2007), in that if work is tailored to the learning styles of a particular gender, the students will be more inclined to participate in the learning activity (Caspi et al., 2008).

Laptop Computers

Laptop Computers in Schools

Educationalists such as Loader (1997) and Stager (2006) are advocates of the individual laptop program currently employed in Victorian schools. According to Stager (2006), the program’s ethos was to "empower students and challenge every school convention to do with curriculum, assessment…" (Stager, 2006, p. 45). Since then, various studies have challenged this, questioning whether this ethos is authenticated in schools (Dunleavy & Heinecke, 2007; Hu, 2007). Trotter (2008) highlights this issue in an American newspaper article, stating that various American
schools have backed away from implementing laptop computers in recent years because of issues such as high cost of standard laptop computers and their questionable benefits to student achievement. Stager (2006), however, argues that many schools adopt the laptop program without thinking through the educational values and directions for the school.

**Laptop Computers and Gender Issues**

Whilst computers and education, and even more specifically gender issues in computers and education, are under continual debate and scrutiny, there is minimal research surrounding gender issues with laptop computer programs. In 2007 a quantitative study of Year Seven students found that although girls had similar access to computers as boys, adding technology did not mitigate gender effects (Dunleavy & Heinecke, 2007). Furthermore, Abbot (2006) indicates that although most girls have embraced this laptop technology, others feel as if they are “failing often in relation to the use of technology” (Gee, 2006, cited by Abbot, 2006, p. 41).

In today’s society, the individual laptop program is more prevalent within everyday classrooms. There are many activists of this initiative including Papert (1980, cited by Dunleavy & Heinecke, 2007), Loader (1997), Stager (2002a, 2002b), and Brown (2003, cited by Dunleavy & Heinecke, 2007). Nevertheless, this type of “technology is often embraced by philanthropists and political leaders as a quick fix” (Hu, 2007, p. 1) in the classroom leaving “teachers flummoxed about how to integrate the new gadgets into curriculums” (Hu, 2007, p. 1). Although teachers can be left in the dark about how to integrate this technology into the curriculum, it is important that they carefully think about their approaches to ensure that they engage both genders (Abbot, 2006; BECTA, 2008a).

One quantitative study (Dunleavy & Heinecke, 2007) involving 100 Year Seven students showed a laptop program working efficiently in their school. Another finding, however, was that the independent laptop instruction was more effective for boys’ achievement. The reason for this disparity is unknown. The article summarised its research indicating that “additional detailed information is needed to assess the impact of 1:1 laptop computers on teaching and learning” (Dunleavy & Heinecke, 2007, p. 9).
Another mixed method study that examined technology use in both Primary and Secondary Schools, found that Primary Schools, in comparison to Secondary Schools, used laptop computers more regularly (60% versus 40% respectively); however it also failed to explain the reasons for this comment (Hollingworth et al., 2008). More research is needed to determine the value of ILPs and their place in schools today.

A newspaper article written in the New York Times (Hu, 2007) provided an alternate view on the ILP. Although the article only presented one side of the argument, it introduced some of the prevalent issues that teachers are facing as a result of this program. These issues include seeing no changes in student achievement, teachers finding that computers distract learners, laptop computers being abused by students, technical problems and high maintenance costs.

Hu (2007) argues that “the art of thinking is being lost, because people can type in a word and find a source and think that’s the be all, end all” (Hu, 2007, p. 1). In the same article, a statement from one of the boys they interviewed said the computer “made him a lot better at typing but not a better student” (Hu, 2007, p. 2). These perspectives once again help to endorse Stager’s (2006) point of view.

Stager, an advocate for the ILP, in his article ‘Laptops: Growing pains and disappointments’ argues the value of laptop programs, and questions whether computers are being utilised in the correct way (Stager, 2006). Despite a very strong personal slant in his argument, rather than making comparison or drawing on factual research data, Stager nevertheless believes that schools are underutilising computers. The perspective Stager presents (2006) in this article is analogous with Hu’s article (2007). Although it does not have as negative a viewpoint, it is written with the aim of improving the use of laptop computers rather than removing them altogether (Stager, 2006).

Adding more negativity to the program, Abbot (2006) found that “girls hate technology with a passion, battle with their notebook computers and can’t wait to abandon them for more traditional means of learning” (Abbot, 2006, p. 1). It is obvious that this negative literature is not showing the ILP in a positive light.
Further investigation into gender differences and laptop programs is warranted to help evaluate Stager’s ethos (2006), particularly in light of the high cost of introducing laptop programs in schools. In order to pursue the opportunity to employ an ILP across a wide range of educational settings however, computer companies are going to the effort of creating a new computer designed specifically for the primary school student (Trotter, 2008). By doing this, computer companies will overcome some of the concerns discussed in Hu’s (2007) article in regards to the need for computers to be small, lightweight, robust and energy efficient. As Trotter (2008, p. 1) said computers need to be “created by educators for educators.”

**Role Models/Stereotypical Images**

Role models and stereotypical images can play a major part in relation to how society perceives and uses computers. Today females are still portrayed as passive ICT users, and males as dominant (Leech, 2007). This effect of stereotypes in society still has a significant impact on girls (BECTA, 2008a).

In an article about increasing female participation with computers, Redmond (2006) presented and discussed significant issues from previous studies such as stereotyping, the methodology involved with ICT teaching, and the issue of the lack of females studying ICT. She stated that “girls require a number of ICTs using female role models” and that the “direct and indirect contact with positive ICT role models will assist in dispelling inaccurate images of computers” (Redmond, 2006, p. 17).

Although the quote about the cyclical nature of technology and gender made by Leech (2007) appeared to be her personal perspective on gender stereotyping, her discussion paper stated that boys are dominating computer classes and continue to make use of the computer labs outside class time (Leech, 2007).

The gender of teachers can play a pivotal role for girls because positive female role models can affect girls’ interest levels (Leech, 2007; Meelissen & Drent, 2007). It is essential that educational systems help girls to see that they can still use computers without losing their femininity (Redmond, 2006). In addition to their affect in educational settings, research shows that role models effect students’ attitudes towards computers at home (Meelissen & Drent, 2007). When looking at role models
in the home environment, this Dutch study (Meelissen & Drent, 2007) found that fathers tend to use the computers more. As a result, boys involved in the study had a gender stereotyped view of computers. Although the research was very thorough in its cross analysis approaches, it used data from over ten years ago, thereby questioning the validity of such statements (Meelissen & Drent, 2007). Despite this, in a similar study which used up-to-date data, Bain and Rice (2006) discovered that most respondents’ fathers were the biggest users in their home environments, a finding that echoes that of Meelissen and Drent (2007).

Redmond’s findings (2006) were reiterated in a large study examining the use and attitudes towards computers, where it was discovered that although access issues are decreasing in prevalence, ICT is still stereotyped towards males (Li & Kirkup, 2005). Furthermore, as men are prominent in the ICT field, software continues to be designed and is more appealing to males and thus “the cycle continues and the technology itself becomes gendered” (Leech, 2007, p. 8). This causes females to become disinterested and as a result, software was not designed with girls in mind (Chalmers & Price, 2000; Wilkes, 2006).

As Timms et al. (2006) realised in their mixed method research conducted with secondary students, it is important that women are involved in ICT related careers and ICT subjects to stop the cycle of gender imbalance.

Another study (Sanders, 2005) presented a detailed research review which consulted over 650 sources of information. The review stated that parents are very influential and can affect the way their children feel about computers. In addition, she said that parents need to be careful, as boys can often retreat, using computers in the home environment to avoid social interaction. When discussing common uses for computers earlier in this chapter, BECTA (2008a) and Hargittai and Shafer (2006) highlighted that girls prefer social interaction, using email and chat rooms whilst boys steer away from the social opportunity the computer can bring, thus the conclusion by Sanders (2005) could be true.
**Technical Issues and Support**

One of the most limited areas of research in relation to gender differences and ICT is in relation to technical issues and support. Although Hollingworth et al. (2008, p. 17) state an “important measure for successful integration of ICT in school was built in technical support”, there is limited research surrounding technical support and what students should do if they encounter any technical difficulties whilst using computers. Markauskaite (2006), supported by Bunz et al. (2007), briefly examined this issue in their study of university students and discovered that the majority of boys would either fix technical issues themselves or use the tools on the computer to help them. In contrast, if girls encountered a problem, they would ask for help. Markauskaite (2006) explained these differences by saying that these methods are used by each gender because it suits their individual learning style.

In one mixed methods study (BECTA, 2008b) examining how parents engage with children’s learning with new technology at home, it was discovered that fathers are more engaged and willing to solve technical problems, however, the research did not provide any explanation for or the reason behind this claim.

As research in the area of technical issues and support is limited, further exploration is required to help understand whether gender differences exist and what the implications are for teaching and learning as a result of these findings.

**Conclusions**

In summary, there have been several critical conclusions drawn in this literature review surrounding the current knowledge surrounding ICT and gender education. These findings include:

- Although both genders demonstrate a positive outlook towards ICT, males are more positive towards the medium.
- Motivation increases for both genders with ICT usage; and whilst motivation amongst males is higher, neither gender is disadvantaged.
- Males are the more capable users of ICT. Research has shown that females underestimate their ability and that their perceived ability discourages computer use.
- Males have high levels of confidence, irrespective of ability. Single gendered environments can however improve female confidence levels.
- Access is becoming more equitable, however, males are still higher users of computers.
- ILP has not eliminated gender effects. It has proven to be more effective for male achievement.
- Males remain the dominant users of ICT with females taking on a passive role with the medium.
- Role models, both at home and at school, play a key part in forming positive perceptions of and influencing ICT use.
- There is limited research surrounding technical support and gender issues, however, there is some suggestion in the literature that boys attempt to rectify problems themselves whilst girls ask for help.

This literature review has also identified gaps within the literature, some of which have been used to form the basis of this study, and these include:

- Students have high interest levels and positive attitudes during the initial stages of using computers. Female interest levels and attitudes changes negatively over time. Therefore consideration needs to be given as to how to overcome this to issue.
- Given the high cost of implementing the ILP in addition to a lack of research in the area, it is necessary to examine the value of the program and whether computers are being utilised in appropriate ways in educational settings.
- Past research has highlighted the importance of having technical support imbedded into computer programs, however, there is limited research surrounding the requirements of this support.

**Implications**

In summary, each of the studies discussed in this review indicate some form of gender inequality with computers. Given the increasing importance of ICT in education, and modern society, it is essential that both genders are not disadvantaged in the use, access or stereotypical images surrounding computers. The following
chapter will discuss the methodology surrounding this study, which aims to examine the potential gender differences between two technologically diverse classrooms.
CHAPTER 3: METHODOLOGY

Methodological Approach

When approaching qualitative research there are wide variety of frameworks available, including action research, ethnography, and case studies, all coupled with their respective advantages and disadvantages. Although each methodology collects and analyses empirical evidence, it is important to consider the required outcome when deciding upon a specific approach.

In this study, action research, an approach which implements change in an iterative fashion, has been excluded from consideration as this study’s aim is to develop a greater understanding of gender differences, computer access and ICT rather than to develop a specific change.

Ethnography, a social science approach to research, describes and analyses the practices and beliefs of cultures (Freebody, 2003). When applying this to an educational setting, researchers are interested in the social and cultural dynamics of a school or classroom, rather than investigating contemporary phenomena in a real life context as examined in a case study. Ethnography produces accounts about the ways of life based on observation (Denzin, 1997).

Case studies, in contrast to ethnography, enable the researcher to explore one or “multiple bounded systems over time” (Creswell, 2007, p. 73), using detailed data collection methods, such as interviews and observations, to develop a report incorporating a case description and various case themes (Creswell, 2007). This type of approach aims to refine the way practice is theorised so investigators and educators can reflect on educational practices (Freebody, 2003).

Ethnography, in contrast to case studies, relies solely on observations and the interpretations of the investigator (Yin, 2003), thus increasing the potential for bias. Case studies allow more flexibility (Yin, 2003) through which data can be collected from multiple sources, potentially increasing the validity and rigour of the approach (Creswell, 2007). In addition to the reasons listed above, as the aim of this research...
was not to look at the beliefs or practices of different cultures, a case study approach was selected.

This case study examined individual students in their natural setting at school, so as to investigate the way in which they attribute meanings in social situations using ICT (Burgess, 1985). Qualitative research entails a methodology in which “theory is grounded in data such as observations, interviews, conversations and their interpretations” (Greig & Taylor, 1999, p. 54). In the Methods section of this chapter, explanation will be given about how this was achieved in the study.

Defining the specific type of case study employed in this research was not straightforward. Whilst Stake (2005) and Creswell (2007) discuss types of cases as instrumental and intrinsic case studies, Yin (2003) uses the terminology single case designs to define different types of cases. In addition, Yin progresses further, describing different rationales for single cases, e.g. critical case, typical case, longitudinal case which enables researchers to identify the specific motivation for a single case design. Coupled with differences in terminology, these approaches do not lend themselves easily to direct comparisons.

According to Stake (2005) and Creswell (2007), an instrumental case study’s defining feature is that it allows the study to focus on a “specific issue, rather than the case itself, as the case becomes a vehicle to better understand the issue” (Creswell, 2007, p. 245). Alternatively, if faced with a unique situation, an intrinsic case study could be used as this enables the focus to be on the case itself.

Similarly to the two case studies defined by Stake (2005) and Creswell (2007), Yin (2003) uses the term single case design to describe an approach which examines, as the name suggests, one case. From Yin’s perspective however, rather than having two types of case designs, one of his five rationales should be applied so the case study has direction and definition. These rationales include the critical case study where a well formulated theory is tested, an extreme case study where a disorder or injury is analysed and, as used in this research, a longitudinal case study where observation is made of the changes that occur over a period of time.
Whilst the various case study designs of Stake (2005) and Creswell (2007) could have been applied to this project, the decision was made to utilise the \textit{longitudinal singular case type} endorsed by Yin (2009). This approach allows for the focus to be placed on a specific issue from each gender’s perspective, leading to deeper understandings of gender engagement with ICT and rich cross-case comparisons, exemplifying potential gender differences. It should be noted that the research included the applied social science and cognitive science orientation of Yin (2003) throughout.

As discussed above, although there are differences in the way Stake (2005), Creswell (2007) and Yin (2003) approach the design of their case studies, they do share a common perspective about having \textit{holistic} versus \textit{embedded} case studies. Adopting a \textit{holistic} approach enables an exploration of the entire case, whereas an \textit{embedded} approach allows analysis of more than one unit of the case study. As this project was trying to examine the impact of the ILP from the perspective of each gender as well as an overall picture from the whole case, an embedded case study was the appropriate approach. The potential risks of an embedded design are that this approach can often focus on small units and not take into consideration the whole perspective. If this occurs, then the “case study itself will have shifted its orientation and changed its nature” (Yin, 2009, p. 52). This will be taken into consideration during the design and analysis stages of the project, in order to help overcome this potential risk.

\textbf{Methods}

\textbf{Sampling}

In qualitative research, the sampling approach should provide the researcher with insight from the chosen phenomenon (Burns, 2000). In this study, \textit{purposeful sampling} has been employed in order to achieve this objective. As Patton (2002, p. 230) states “the logic and power of purposeful sampling lie in selecting information rich cases for study in depth”. Furthermore, the sample should aim to be representative of the population being sampled (Burns, 2000).

Numerous \textit{purposeful sampling} strategies, such as \textit{stratified sampling}, \textit{systematic sampling}, \textit{maximum variation}, \textit{snowball sampling} or \textit{stage sampling}, were considered
in relation to this study (Burns, 2000; Greenfield, 2002). Many of these were excluded however, as they did not suit this project \textit{(snowball sampling, systematic sampling)}, nor were they suitable when working with individual children \textit{(stage sampling)}. Thus, both \textit{stratified sampling} and \textit{maximum variation} were used to select participants.

\textit{Stratified sampling} ensured that the sample, where selection was based on one variable, in this case gender, reflected the structure of the population. As \textit{stratified sampling} can be chosen in combination with another strategy, \textit{maximum variation} was also selected as it “document[s] diverse variations and identifies important common patterns” (Creswell, 2007, p. 127). This method allowed the capture of diverse cases and the description of central themes observed within them. Additionally, this strategy avoided one-sided representation. The combination of these strategies aimed to enhance the quality of the sample so further insights could be deduced. In relation to this study, these strategies helped to ensure that samples of both genders and both extremes, in relation to computer engagement, were selected.

\section*{Sample Selections and Size}

This study was conducted at an Independent Co-educational Anglican Primary School in metropolitan Melbourne. The school was selected as it employs the individual laptop computer program in Year Five. In addition, as this study relied on students progressing from having limited access to computers to having daily access to the ILP, only one year level needed to be considered for the project. Therefore, those students in one Year Four class in 2008 were given the opportunity to be involved in the research. Only 16 of the 25 students chose to participate in the study. The same 16 students were involved in Stage Two the following year when they received individual laptop computers. This generated the need for a two-stage data collection design.
At the start of this study, students were aged between nine and ten years old. In the following year, when these students entered Year Five, they were aged between ten and 11 years old.

At this Co-educational Independent School there are four classes at each year level. This study required co-educational classes to enable the analysis of gender differences in the results. During initial selection in Stage One, as two out of four classes were single sex classes, they were not relevant for this study. Therefore there were only two possible class groups that could have been used for this study. Because there was no difference between these two classes in male to female ratio, the teacher appeared to be the only variable. Thus the class was selected using criterion sampling, with the criterion relating to teaching experience, increasing the quality assurance of the sample (Patton, 2002). The class was selected based on the teacher with the most experience. This sample selection method was chosen with the aim of having quality assurance within the sample (Patton, 2002).

Sample size is an important element of sample design (Greenfield, 2002). When deciding upon size, the figure needs to correlate to the methodological approach used.
for the study. Larger samples, generally used in quantitative research, come hand in hand with increased accuracy, allowing for stronger results. Furthermore, the greater the sample size, the better the chance of gaining representativeness (Burns, 2000). When using a case methodology, however, the aim is to develop in-depth understandings rather than empirical generalisations (Patton, 2002) and thus a large sample size was not required.

As this study replicates the data collection stage with the same participants over time, it was important that attrition, caused by factors such as a floating population, or children coming under the direct instruction of the researcher, was allowed for during the selection phase. According to Burns (2000) attrition usually equates to a ten percent loss of the initial sample. As a case study relies on very few participants, it was critical for this to be taken into consideration prior to beginning the research to help ensure that there were not too few participants in the second phase of the study.

Some theorists, including Yin (2003) and Creswell (2007), suggest that you should undertake no more than four to five cases; otherwise a project of this size becomes unmanageable for the researcher. Furthermore, Opie and Sikes (2004) state that you should use enough participants to begin with, to allow for attrition. Although the methodology involved a singular case study, the Year 4 class, there were 16 candidates within this one site which provided ample data to identify themes, and allow for cross case analysis and attrition (Creswell, 2007).

Gaining Access to Sites/Participants

Gaining access to sites and/or participants involved several steps:

- Application to the University Ethics Committee.
  - Enabling review board to analyse potential risks.
  - Lengthy process requiring detailed description of specific procedures when completing research with minors (Creswell, 2007).
  - Application detailing the project, objectives, identified potential risks and explaining how partakers were protected.

Further information about ethical guidelines is discussed later in this chapter.

- Participants and teachers provided with Plain Language Statement (see Appendix 1) and Consent Forms (see Appendices 2 and 3).
Similar to the ethics application this document detailed the central purpose of the study, data collection procedures, withdrawal options, confidentiality agreements, possible risks involved and any reciprocity.

If parties (participant, teachers and researcher) consented, signatures were required prior to the commencement of the study.

- Approval required from the ‘gatekeeper’ (Bell, 2005; Creswell, 2007; Opie & Sikes, 2004) in this case, the school principal, to enable this study to proceed (See Appendix 3). As the project was conducted at an Independent School, no other approvals were required.

- Students attended the same school but participants had no direct relationship with the researcher. As the students moved year levels, however, it was possible that a participant might be under the researcher’s instruction. In this case a decision would have been made to withdraw the student from the study.

Two-stage Data Collection

As discussed earlier, the rationale for this case study, a longitudinal case, was chosen as it enabled examination of participants and their conditions as they changed over time. During Stage One, participants underwent an observation, completed a questionnaire and were interviewed. Participants’ parents also completed a survey. These data collection methods were replicated in Stage Two to allow examination of similarities and differences.

- Interviews

Interviews, an important source of information in case studies, are a means of finding out what is on subjects’ minds (Greenfield, 2002). This method allows questions to be “reported and interpreted through the eyes of the interviewees,” (Burns, 2000, p. 467) providing important insights and identifying other sources of evidence. Although data can be misinterpreted (Hughes, 2002) and inaccuracies can exist due to poor recall (Yin, 2003), this method enables direct focus on the case study topic.

Selected for their flexibility, semi-structured interviews still impose overall shape in comparison to unstructured interviews (Opie & Sikes, 2004). Pre-prepared questions help prevent the rambling often associated with an unstructured approach, whilst allowing changes to the order of questions and possible deviation from the interview
guide (Opie & Sikes, 2004). Furthermore, using semi-structured interviewing techniques enables clarification of responses which helps ascertain deep feelings and emotions (Opie & Sikes, 2004).

Semi-structured interviews, lasting approximately ten minutes, were conducted with participants during both stages. Interviews occurred in a quiet room, free from distractions. Interviews were audio recorded and field notes were kept to ensure hand signals and facial expressions were recorded. Refer to Appendix 6 for information about the interview guide.

- **Transcription of Interviews**

Interviews were kept electronically. Verbatim transcriptions were created to ensure direct speech was recorded. A transcription sample can be found in Appendix 14.

- **Observations**

Another form of data commonly used to enrich case studies are observations (Burns, 2000; Creswell, 2007; Yin, 2003). Although requiring special skills, observations are a useful means of addressing issues that may not have been apparent in interviews (Creswell, 2007) and can be used to verify other data collected (Opie & Sikes, 2004). In addition, when used in conjunction, interviews can be used to further clarify observations, which could otherwise be open to the interpretation and bias of the observer.

When observing, it is essential that researchers pay attention to what they observe and listen carefully to what is happening in the area. By doing this, the research is “better able to understand and capture the context within which people interact” (Patton, 2002, p. 262). Furthermore, it is essential that in-depth field notes are taken to ensure that the moment is captured descriptively. It is also important that, as a researcher, you concentrate on “separat[ing] detail from trivia” (Patton, 2002, p. 261) to help you capture things that may be extraordinary or uncommon for participants in that environment.

In this study, student participants were observed completing various ICT tasks during both stages of the project. Together with the skills test participants were completing, any noticeable reactions or notable dialogue between the participant and observer
were recorded. Written notes and checklists (Refer to Appendix 7) were kept to try to ascertain the achievement level of the participant.

- **Questionnaires**

Although a technique not commonly associated with case study research, questionnaires are a good way to remove ambiguity and test adequacy of response categories prior to using the methods listed above (Bell, 2005). In this study, similar questions have been used in the questionnaire and interview to help confirm responses. Furthermore, questionnaires are a confidential way of collecting data. They enable participants to work at their own pace and do not allow the interviewer to influence results.

A questionnaire was administered at the beginning of each phase of study, as an attempt to establish the effect the laptop computer program has had on the group between two stages of the research. As discussed later in this section, this test-retest method is a good way to check reliability of the study (Opie & Sikes, 2004).

**Data Analysis**

One of the most important aspects of research is the analysis phase. Nevertheless, this area is “one of the least developed and most difficult aspects” (Yin, 2003, p. 109) of using a case study approach.

Analysis of data was completed in multiple steps, moving in an analytical spiral as opposed to a linear approach (Creswell, 2007). After reading through raw data and breaking it into manageable units, initial concepts or themes were identified. This enabled the management of information whilst attempting to develop an overall structure to the data (Spencer, Ritchie, & O'Connor, 2003). Data was then labelled and sorted by themes or concepts and summarised. Following this, data categories were carefully examined through two different techniques, direct interpretation and patterning. Direct interpretation looked at single instances, for example, the challenge of access to computers in a four computer classroom, and then drew meaning from this case in point (Yin, 2003). Patterning established and looked for correspondence between two or more categories and used matrices or tables to show relationships between the categories, for example, comparing two or more children.
(Creswell, 2007). Refer to Appendices 11, 12 and 13 for more information on data analysis techniques.

**Data Analysis Software**

The qualitative data analysis program QSR Nvivo8 was selected for analysing data as a personal preference due to prior experience with using computers and this data analysis software. In addition, QSR Nvivo8 handles large amounts of data, searches through data easily and, specifically with this program, allows visualisation of data through the concept mapping tool (Creswell, 2007). Learning to use this software’s full functionality was managed by attending QSR International’s two day training program.

**Rigour, Trustworthiness and Ethics**

According to the Encarta World Dictionary (Microsoft, 2008), rigour is defined by “the application of precise and exacting standards in the doing of something” (Microsoft, 2008, ¶1). Methodologists Yin (2003), Opie and Sikes (2004), and Creswell (2007) agree that there are multiple characteristics required to complete a rigorous qualitative study. Similar to the issue about case study typology discussed earlier, although terminology differs between authors, they all suggest ways to help ensure the study is worthwhile and rigorous. For ease of comprehension of this section, techniques have been organised into respective stages of research.

**Validity and Reliability**

Validity, a gauge of rigour and trustworthiness, informs researchers whether the instrument measures what it was meant to (Opie & Sikes, 2004; Bell, 2005). These tests may be either internal or external.

Measuring a study’s external validity establishes ways in which it can be generalised. This device is usually employed during the research design phase of the study, however, critics suggest that using this method for case studies of the size prescribed here “offer poor basis for generalising” (Yin, 2003, p. 37). Thus, no attempt was made to achieve external validity as it was not the aim of the study to make generalisations. There is, however, potential for a similar study to be conducted
under another methodological framework and with a wider scope of participants after
the completion of this research, in order for it to be generalised.

Internal validity relies on evidence to show that the variable you manipulated had a
causal effect on the outcomes. In this case, the ILP was the independent variable
which contributed to observed changes.

Many researchers try to ascertain a level of reliability in their study where certain
tests produce similar results under constant conditions (Opie & Sikes, 2004; Bell,
2005). In an educational setting however, reliability is difficult to measure, as
classroom research is often unpredictable (Opie & Sikes, 2004). However, in the test-
retest method adopted here, the same instrument (namely questionnaires) was used at
different times to compare results and check reliability.

During the data collection (and also the analysis) phase it was essential that the cases
that did not fit with the regular or expected pattern were also identified. During these
stages, all possibilities were considered as there could have been exceptions that
proved, challenged or broadened the rule (Patton, 2002). The aim of this study was
not to be able to make one single, neat conclusion; for example, that gender inequality
still exists when the laptop computer program is employed. Therefore, by looking at
negative cases, layers of diverse yet interrelated themes may have become apparent,
enriching the analysis of the research and providing further insights into gender
differences with ICT.

One way rigour is maintained in educational research, especially case study research,
is by drawing on multiple sources of data (Creswell, 2007). One way of achieving
this is through a process of triangulation.

**Triangulation**

Triangulation, a method of validation, can be classified into four basic categories:
*data triangulation*, *investigator triangulation*, *theory triangulation*, and
*methodological triangulation* (Denzin, 1978).

*Methodological triangulation* is reached when researchers make use of multiple and
varied sources or methods to provide substantiative evidence. This technique can be
easily achieved when conducting a case study, as case studies rely on multiple sources of information to analyse. Although observations and interviews are most frequently used, no method is excluded (Bell, 2005). In this case study, triangulation was attained by using interviews, questionnaires and observations in the form of a skill assessment.

Another type of triangulation used in this study was data triangulation, where different participants were cross examined, over multiple time frames, in order to gain a wide range of perspectives. This study had points of views from three different sources, namely parents, students and the research (during the observational stages), which increased the credibility of the study.

Spending adequate time in the field is an essential aspect for maintaining precision during the data collection phase. Extended periods of time have been spent with each participant over the course of the study. The site and participants were easily accessible as the study was being conducted at the researcher’s workplace. At least two hours was spent with each participant individually over the course of the project, as well as time in the classroom with the students when they were together as a whole class.

**Integrity of Analysis**

With any type of research, eliminating personal predispositions or biases is very challenging. Therefore, it is important that consideration is given about how to “counter such a suspicion before it takes root” (Patton, 2002, p. 553). As Patton (2002) suggests, discussing or acknowledging any foregone conclusions you may have is one strategy that can help uphold the integrity of analysis. Another approach is to “look for data that support alternative explanations” (Patton, 2002, p. 553). These strategies were used within this research project to help in maintaining the integrity of analysis.

**Ethics**

The Melbourne University Human Research Ethics Committee approved the study in November of 2008 (Ethics ID Number HREC0830082). The Principal of the school also granted approval in November 2008.
According to Sieber (1993, p. 14), “ethics has to do with the application of moral principles to prevent harming or wronging others, to promote the good, to be respectful and to be fair”. Following are the ethical considerations that were made in development of this study.

As Hart and Bond (1995, cited by Bell, 2005) note, participants need time to review the implications of the study to ensure they are not agreeing as a result of anxiety or pressure (Bell, 2005). Therefore, consent forms were provided for participants’ consideration prior to the study commencing. As the study involved minors, a signature from parents/guardians was required.

Although not directly involved, teachers and heads of section were given plain language statements and consent forms to sign. These were returned prior to the commencement of the study.

- **Confidentiality**

  Information collected in this study has been kept confidential. Pseudonyms replace names of the school, students or families in this study. As anonymity officially implies that “no one, including you will know who has completed” (Bell, 2005, p. 49) the data, participants were informed therefore that anonymity would be maintained in the context of this study, thus allowing revision and interpretation of data in an unbiased fashion by the researcher.

- **Data Access and Ownership**

  At any time, participants had the right to withdraw from the study, in which case all data and documentation would have been destroyed.

Data collected during the study will be retained for five years. Subsequent to this, approval will be requested from the Departmental Head to destroy data. As digital recording was utilised, magnetic field bulk erasers are not necessary to destroy audio tapes, however, electronic information including audio recordings will be rewritten and reformatted. Any paper records will be shredded.
• **Documentation and Analysis**
During analysis, acknowledgement has been given to any theoretical frameworks influencing the study, and issues encountered in the study have been documented.

• **Managing and Protecting Participant Well Being**
One of the potential risks to participants was the students’ concern for their ability levels in relation to others. Conversely, if students felt there were differences in achievement levels with other peers, emphasis could have been placed on their computer work, thus promoting ICT.

Adverse or unexpected outcomes are always possible in research. In preparation for these risks, arrangements were made for the school counsellor to be available, should any issues arise. In addition, participants and parents were aware that they could withdraw from the study at any stage, should they feel uncomfortable or distressed.

• **Managing Potential Risks for Staff Involved**
Managing potential risks for the staff involved required reassurance that their involvement was for research purposes and that their employment status would not be affected. In addition, they were notified that anonymity and confidentiality were adhered to throughout the project.

Irrespective of these risks, this research has provided teachers with a greater understanding of individual differences, including gender differences, when using computers. In addition, professional development was provided for teachers, in relation to understanding children’s computing ability in each stage. After completion of this project, analysis information regarding the effectiveness of the ILP may also act as a pilot for a similar larger study to be completed across a range of educational settings.

**Limitations of the Study**
Although ascertaining rigour and keeping high standards are necessary when completing the academic research, it was important that potential limitations, both the limiting conditions and delimitations (limits), for the study were considered (Bell, 2005).
When analyzing the limiting conditions of the study, consideration of factors such as time, accessibility, reliability, and space was essential (Bell, 2005). Although access to computers and allocated space to conduct the interviews were possible limitations, these issues were minimized by careful planning and organisation, such as booking research resources in advance. Furthermore, it was essential that, before commencing, computers were checked to help reduce the possibility of technical malfunction during data collection.

Another potential limitation was associated with trying to make claims about gender participation on a single site. These results will be reflective of the site itself, rather than being indicative of more general issues associated with ICT and participation. This study was not trying to make generalisations so this limitation was not of concern.

In reference to the delimitations of a study, researchers (Bell, 2005; Burns, 2000; Greenfield, 2002) continually debate the threshold of data for analysis. There is no simple conclusion. It is important that boundaries are drawn by researchers in relation to the question/s they are trying to answer (Bell, 2005). In this situation, it was important that limits were set and that they were taken into consideration when designing the interviews/surveys/questionnaires and that only relevant information was used during the analysis phase of this project. Specific limitations are discussed in detail below.

- **Limitations of Observations**
  When being observed, people can feel judged or embarrassed, possibly causing them to act in an atypical manner (Patton, 2002) which may lead to observations limiting results through participants’ inability to examine factors other than external behaviours, for example, feelings of the participant. Furthermore, the research could have a narrow perspective which may distort the results and needed to be taken into consideration during data analysis.

- **Limitations of Interviews**
  Interviews can potentially distort responses through the emotional effect they can have on the respondent. When utilizing data, issues may have arisen through recall
errors. It should be noted however, that observations and interviews were used simultaneously as a cross check method to increase accuracy of the data.

Summary

In summary, this embedded longitudinal case study examined students in two stages over the course of six months through observations, interviews, questionnaires and parental surveys. The data was analysed with the assistance of QSR Nvivo8. Ethics, rigour and trustworthiness were upheld throughout the course of study.

The next chapter, Research Findings and Analysis, will present the results from the numerous data collection methods and will begin the initial stages of analysis.
Chapter 4: Research Findings and Analysis

Overview

This chapter reports and analyses findings from a series of data collection methods, which have been collated and organised under various headings:

- New Technology
  - Independent Laptop Computers (ILP)
  - Technical Support
  - Language
- Student Opinions
  - Personal Satisfaction
  - Downsides of Computers
  - Usage
    - Time Spent
    - Access at Home
    - Common Uses
  - Ability
    - Perceived Strengths
    - Perceived Weaknesses
    - Perceived and Actual Ability
- Personal Satisfaction
- Downsides of Computers
- Usage
- Ability
- Confidence
- External Factors
  - Parental Support
  - Sibling Influences
  - Aspirations of or for Friends
Stage 1

New Technology

Independent Laptop Program

One aim of this research project was to examine the possible effects of the ILP. At the commencement of this study, children who did not have a laptop were asked to predict any possible impacts of the ILP.

All but three participants envisaged the program would have a positive impact, perceiving it would help them “find out new things” (Aaron S1IQ12), enable them “to go on the computer a lot more” (Sarah S1IQ12), and allow them to “get to use them everyday” (Hannah S1IQ12). One male made a comparison between what his current usage patterns were, and what he envisaged the ILP would bring, expressing:

“We sort of learn new things every day and we improve on them everyday. It’s not once a month that we improve on them” (Wilson S1IQ12).

In addition to the predicted benefits highlighted above, girls felt that the ILP would increase their familiarity with computers whilst boys felt that “I would become more curious to use it” (Jason S1IQ12) and that they would have “more learning by teachers” (Max S1IQ12).

Although most participants perceived the ILP positively, three participants, Bianca, Andy, and Michael made negative associations with it. Bianca stated that it would not be beneficial because:

“These computers here and the laptops are mostly the same but for the computers here you can go onto the internet but with the laptops you have to plug them in” (Bianca S1IQ12).
thus envisaging the ILP to be more inconvenient than the desktop computers. Andy and Michael discussed the personal impact of having a computer, for example; “I don’t really want to become a computer know all” (Andy S1IQ12). Michael said:

“I think that if you taught us with a computer every day and we were practising then we would get better, but if we just had a computer by ourselves then we won’t learn much” (Max S1IQ12), stating that if teacher assistance was not provided, the program would not be successful.

Irrespective of these few students who had a negative impression of the ILP at this time, most participants were looking forward to receiving their laptop with their subsequent benefits such as the opportunity to gain new knowledge, increased use and experience that should transpire.

Technical Support

Whilst reflecting on the ways in which children would cope with technical issues that may arise when using a computer, both genders had similar ideas about people who could provide support if problems were encountered. Most responses indicated their reliances as: “if I was at home, probably my mum and dad and if I was at school then probably the teacher or my friends” (Sarah S1IQ13). One participant said he would “ask permission to ring a computer expert” (Marcus S1SQ6).

Whilst in a home environment, eight respondents specified they would ask a male member of the family, articulating that they would go to "my brother because […] he’s oldest, he probably knows more" (Aaron S1IQ13) as compared with three respondents who would ask for female assistance. Three participants were not gender specific in their responses.

A few participants said they would choose to manage the issues themselves, implementing strategies such as “hit Ctrl + Alt + Delete to end task” (Bianca S1SQ6). Although Bianca could be singled out as the only female participant who would attempt to fix the issue herself, more male participants were willing to have a go before asking others for assistance.
It is important to note that there were small discrepancies between the interview and the questionnaire responses. For example, in the questionnaire Jane said that she would “ask family members” (Jane S1SQ6) if she ran into difficulty, however she was more specific in the interview, saying:

“It would probably be Dad or Tim and if it was here [at school] then I would ask someone who is smart in computers” (Jane S1IQ13).

On the whole, irrespective of whether participants would attempt to fix the problem themselves first, students would either look to their friends, family or teachers for technical support.

**Language**

There were no significant findings to report on the use of language during Stage One.

**Student Opinions**

**Personal Satisfaction**

One area addressed in each of the parent questionnaires, student questionnaires and the interviews related to each student’s personal satisfaction levels when using computers. Although each gender was aware of some negative aspects of using computers, overall, positivity was evident in the responses. High interest levels were found across both genders, as seen in Figure 2 below.

**Figure 2: Interest – Stage 1**
Most participants indicated their satisfaction level by saying “it is fun and quick!” (Sarah S1SQ2), “I like learning new things” (Aaron S1SQ2), “it helps me do my homework” (Bianca S1SQ2), “like playing games on them” (Wilson S1IQ4), and “it’s a good research resource” (Jane S1SQ2). One student even wrote about how she would like “computers for learning when you get older” (Maryanne S1SQ2).

When examining the enjoyment levels of Michael and Lara, there was some disparity with that of others in the project, and the frustration was clearly apparent with Lara in the interview:

"Sort of. I like using computers when I know what to do, because I'm not very good with the whole computer thing. So I like using computers when I know what to do and how to do it. If I don't know then I don't like using computers" (Lara S1IQ4).

**Downsides of Computers**

Students were also asked to think about the negative aspects of using computers. The responses showed diversity across each gender. Females articulated technical issues, having difficulty locating accurate information and cyber bullying as drawbacks of using computers. When boys talked about negative features of computers, issues that the girls spoke about, such as trouble with the internet, were not mentioned. They appeared to see viruses or spending time waiting for the computer to load as drawbacks when using this technology.

Whilst both genders could see downsides to using computers, these issues did not appear to deter children from having a high level of personal satisfaction when using computers.

**Usage**

Usage was assessed by analysing parents’ and students’ responses about the amount of time spent on computers each week, the number of years students have had access to a computer at home, and participants’ common uses for computers.
• **Time Spent**
In this sample, girls utilised technology for an average of one hour and six minutes per week whilst boys used computers on average for three hours per week.

• **Common Uses**
When participants were questioned about their main uses for computers, numerous common threads became evident in each gender’s response. Prior to the ILP, participants used computers mainly for playing games “cause they’re quite fun” (Aaron S1IQ7). In addition, students would often choose to do something creative such as “make the slide shows with the noises on it” (Madison S1IQ5) and “use it for homework, like typing up and making PowerPoint’s and putting them on my USB” (Wilson S1IQ7).

Other uses were mentioned, such as You-Tube and looking at footy updates for boys, and “going on an email thing, I can talk to my friends” (Gabby S1IQ7) and getting music for iPods for girls.

In conclusion, when looking at usage with computers, although both groups of participants utilise computers for similar activities, boys spend, on average, an extra two hours a week on computers compared with girls.

**Ability**

• **Perceived Strengths**
When students were asked about their strengths with computers, many participants mentioned Microsoft programs, stating "I’m definitely really good at Word” (Aaron S1IQ8).

The boys felt animation was one of their strengths, confidently responding with "Oh, I think probably like making animations. I like that. I can do long animations in a short amount of time" (Wilson S1IQ8).

Girls offered additional responses such as searching on ‘Google’, and printing. They even considered tasks such as "turning them on" (Madison S1IQ8), “good at getting
the colours” (Madison S1IQ8) or "logging in and out” (Lara S1IQ8) as some of their fortes.

In more complex definitions of personal strengths, Maryanne used specific language to indicate that she is:

"Good at Word, as long as it is Word 2003 not 2007. And I am good at Google and Google images" (Maryanne S1IQ8).

In contrast to the confident responses mentioned above, two boys struggled to verbalise their strengths, adding comments such as "I am not really sure" (Jason S1IQ8) or "Well, I don’t really have any strengths, I’m just good at working out how to do things sort of and starting programs" (Max S1IQ8).

On the whole, although these two males could not identify their strengths, other students easily recognised MS Office and internet searching as strengths.

- **Perceived Weaknesses**

Although there was a diversity of responses from girls, boys indicated only a few areas of difficulty. It became apparent, however, that they all desired to improve their ability in their perceived area of weakness.

The most verbalised limitation for both genders was the internet, with one boy expressing himself by saying "Arhh, the internet" (Wallace S1IQ9) indicating his hardship when using it. Other responses indicated that they had issues navigating on the internet, clicking on incorrect links and “downloading games and stuff like music" (Gabby S1IQ9).

One participant, who also found internet surfing a challenge, talked about his concerns when using computers and the technical issues that arose:

"Well things I haven’t really used that much, like new things. Say for instance there’s this random website on the internet, I wouldn’t know what to do. Or this problem, this emergency problem thing comes up with the computer and
it has to shut down or something I wouldn’t know what to do and I would have to ask my mum or dad” (Marcus S1IQ9).

Others also mentioned computer malfunctions, for example, “I don’t know what to do when the computer stuffs up or freezes" (Opal S1IQ9).

Lack of understanding of computers was obviously of concern for one participant who said she did not “know where some of the things are and I had to ask” (Hannah S1IQ9).

The male participants talked about the difficulty of sending and replying to emails, whilst girls felt another limitation eventuated when using new programs, "I am not so good at PowerPoint, Excel" (Maryanne, S1IQ9), or gaining new knowledge, "Well I am not good at new programs. They take me a while to learn how to do stuff" (Sarah S1IQ9).

Generally, students were aware of computer weaknesses and were able to identify the internet and various technical issues as their weaknesses.

- **Perceived and Actual Ability**

In order to ascertain students’ actual ability, computer tasks were conducted in five different applications. Prior to this, students had the opportunity to complete a dichotomous survey in which they stated their ability. This survey was analysed against the skills assessment conducted by the researcher. The results for females can be seen in Figure 3 below.
In all 25 computer tasks completed, it was noticeable that females overestimated their actual ability on all but three tasks. It appears that females feel extremely competent with most tasks, however in reality struggle to complete what is asked.

When working in MS Word, most girls (75% +) were able to complete more than 90% of the set tasks. Saying that, however, none of the girls were able to change the page orientation, although 40% of female participants indicated they could. Problems in the skill assessment in MS PowerPoint, MS Excel and MS Outlook showed dramatic differences in their perceived and actual ability, with many female participants being unable to complete the requests. The internet task and saving a document in Word were the only sections of the test that participants’ actual and perceived ability were aligned.

Males also had an extremely strong impression of their ability, with all but one task having an equal or higher rating than their actual knowledge. Figure 4 below provides a visual representation of these results.
All boys could complete six out of nine tasks in MS Word. Like the girls, most male participants struggled with tasks in MS Excel and MS PowerPoint. Approximately 90% of male participants successfully replied to an email, however could not demonstrate further knowledge by attaching files or forwarding emails. All students were able to complete the task on the internet.

On the whole, although both genders overestimated their ability, males were more capable users of computers. Figure 5 below provides a visual representation of these results.
Confidence

Another aspect examined in the study was the participants’ confidence levels. Information was gathered from the students via interviews and questionnaires and from parents through surveys. All responses were collated and sorted into groups, showing positive and negative associations with the term confidence.

When students rated their confidence on a five point scale (See Figure 6 below), over 80% of male participants ranked themselves as four or five compared with only 33% of females.
During interviews many males indicated they were confident using computers. The most common reason for this was as a result of them knowing “pretty much everything” (Max S1IQ6). Another participant, Wilson, talked about computers being “quite easy to use” (Wilson S1IQ6). Andy drew parallels between his high level of confidence and how much he enjoyed using them. One parent stated that their child was “very confident with exploring and researching topics whether it is homework or things my child is interested in” (Gabby S1PQ4).

Six females and one male demonstrated either low or intermediate levels of confidence. These students explained this rating by saying “I can do most things but sometimes I need a little help doing other things” (Jane S1IQ6) or that they “worry because sometimes you can make a tiny mistake and it’s all gone and I am unable to get it back” (Sarah S1IQ6). Madison talked about her lack of confidence in her ability, saying:

“I usually can’t remember if it’s a certain program or something. And I’m just not that good at them” (Madison S1IQ6).

Lara, who also lacked in confidence, explained her experience when working on computers:
“We have a computer at home but I never use it so I don’t have any practice and um in ICT my partner normally does all the work and I just tell them what to write because I just go like this [indicates tapping to represent one finger typing]” (Lara S1IQ6).

Overall, when similar questions were asked, although some females showed high levels of confidence, most lacked in confidence in comparison to the male counterparts.

**External Factors**

**Parental Support**

Whilst reflecting on responses from students, it became obvious that both genders look up to their parents as role models in the computer field.

Although all but one respondent said that both of their parents could use computers, the gender selected as the most capable user was biased towards males when their ability was questioned. A majority of respondents look to their dads “as pretty much an expert” (Marcus S1IQ11). Although respondents indicated that both their parents can use computers, they talked about how their “dad’s really good at computers” (Sarah S1IQ10). Aaron talked about how:

"My mum knows nothing about computers. Well she probably does but she doesn’t really know anything about technology. My dad he goes on computers 24-7. He’s really good" (Aaron S1IQ11).

Furthermore, some associated this difference in ability as a result of their mother’s reliance on the father for computer support stating:

"My dad is pretty good because sometimes if there is a problem, my mum will wait until my dad gets home to work it out" (Sarah S1IQ11).

Although there was only one male who said “My mum is alright at it and my dad has no idea” (Wallace S1IQ11), there were two females who said that their mothers were
highly skilled in using computers. These girls talked about how their "mum kind of just told me what to do" (Gabby S1IQ10) when learning how to use computers. They also made connections between their jobs and their ability to use computers and the amount of time spent on them. Maryanne expressed this by saying:

“My mum, she can use computers but my dad, he’s not so good at it, but if you show him something, he learns pretty quickly (Maryanne S1IQ11).

Other female participants said that:

“Both my parents can use computers. They’re both as good as each other” (Madison S1IQ11).

All bar one participant had parents who could use the computer. Out of these parents, most children would go to the male figure in the household first if assistance was required.

Sibling Influences

When looking at participants’ relations, it was found that over half of the students involved in the study had an older sibling, with exactly 50% of those siblings being brothers.

Some participants with older male siblings made comments such as “my brother sort of taught me” (Aaron S1IQ9) or that "my brother’s the best in the family" (Wallace S1IQ10). One female participant said during an interview that she would go straight to her brother if there was an issue with her computer (Gabby S1SQ6), thus demonstrating the reliance by this participant on her brother as a role model and support.

Aspirations of or for Friends

When assessing other students’ abilities, most students felt their male peers showed higher computing ability. These assessments are represented numerically in Figure 7 below.
Irrespective of gender, commonalities were found in responses when participants were questioned why their peers had high aptitudes. Seven students correlated their peers’ ability with knowledge. Although there were no clear reasons for stating this, one student mentioned “she just knows lots about them” (Hannah S1IQ15) whilst another said “they know a lot of stuff – well more than me – and they can do a lot of things with a computer” (Gabby S1IQ15).

Aside from demonstrating in-depth knowledge about computers, frequent usage was another way participants were influenced. Both genders commented that “they’ve had more practice” (Lara S1IQ15) or they “just spent their time around them” (Andy S1IQ15). Sarah stated that Andy is better because "if there was free time he would probably be the most likely to go on the computer" (Sarah S1IQ15).

Another common response from participants, when explaining the reasons for other students’ superior skills, was “because if I ever ask them in the classroom they always know what to do” (Aaron S1IQ15).

Michael was very articulate in his description, comparing his choice to the rest of the class:

“Well, they always know what they are doing and they can always, when we are given a task to do on the computer, add in something extra, like sound for the PowerPoint or a picture or their own [sound] that they have made on the internet" (Max S1IQ15).

Maryanne indicated knowledge was responsible for the high aptitude of the male she selected. She explained this choice and made a comparison between boys and girls by saying:
"I don’t know, he just is really good at using them and he sets up the power point thing and he fixes your computer and he just knows how to do it. I don’t really know of any girls that do know how to do it" (Maryanne S1IQ15).

Aside from the reasons mentioned above, which were consistent across both genders, one female believed that her capable peer was really good "because they have older brothers and sisters that are at the school and they probably teach them a few things" (Madison S1IQ15).

In summary, most participants perceived other males to be of the highest standard in computing, explaining that usage, increased knowledge and the willingness to help others as the reason for their selection.

The results discussed above were collected in Stage One of the study and will be compared with the results below that have been collected in Stage Two, when children had been using a personal laptop for six months.
Stage 2

New Technology

Independent Laptop Program

As previously mentioned, one major motivation for this study was to examine the effects of the ILP for children in this study. During Stage Two children had been utilising laptop computers for six months and in interviews they commented about the perceived impact of the program.

Almost all of the participants indicated that the ILP had been beneficial to them. They were enthusiastic in their speech and had much to say on this initiative. When examining their responses, there were many common threads between the genders.

Both genders felt that ILP made this initiative “an interesting way to learn” (Hannah S2IQ12). In addition, one boy, Marcus, denoted that:

“It’s helped me to understand all those things that I have never actually learned” (Marcus S2IQ12).

Comments were also made in relation to the acquisition of knowledge stating:

“I know most things about my laptop” (Madison S2SQ3).

Madison, who believed she had improved in comparison to last year, felt that it “becomes like a routine” (Madison S2IQ12) to use computers everyday. Similarly to Madison, students also spoke about how they “use them a lot more” (Jane S2IQ12).

Student feelings of their increased self esteem also emerged during discussion with both genders:

“I sort of feel a lot more confident with computers now” (Aaron S2IQ12).
In addition, Wilson said that having his own computer:

"Means that I can have a private computer and just do what I want….this one is safe. It’s…fast loading" (Wilson S2IQ12),

which was a mutual feeling amongst most participants.

A couple of students reflected upon the difference between the two stages of the project saying:

“In the past when you didn’t know something it was hard to find out. Now I can do lots of things” (Bianca S2IQ12).

Sarah concurred with Bianca saying:

"It’s a lot easier after having one. Since I’ve had more experience with computers because we use them a lot, I am becoming a bit less scared that I am going to make a huge mistake and experiment a bit now" (Sarah S2IQ12).

In relation to knowledge acquisition, one female participant stated during discussion that she:

"thought it would improve my knowledge a lot more but it has just improved it a little bit more with computers" (Gabby S2IQ14).

She did say however that she:

"think that it will come with time." (Gabby S2IQ14).

By contrast to these analogous perspectives, Michael felt the ILP did not have much effect on him because:

“we just sort of use it for typing up things and emails” (Max S2IQ12).
Michael felt he benefited from experiences when they looked up information online. When questioned whether the ILP was more of a burden than a benefit Michael said:

"I think it is more of a benefit because it gives us something to do and something to use" (Michael S2IQ12).

However, he still did not feel the computer was much assistance.

The responses shared above indicate, that irrespective of the minor differences between genders, the overall perception was that students had gained a lot of valuable learning experiences from the ILP. Furthermore, the participants believed that commonalities existed between genders in relation to increased knowledge and the acquisition of new knowledge, increased self esteem, increased access and use, and an increase in ability, accumulating together to signify overall value for the ILP.

Over the duration of this study, it has become evident that the ILP has increased student knowledge, provided knowledge of new tools, features and programs, and increased student usage with computers. Furthermore, it was perceived that the ILP increased access and ability, neither of which was predicted by students.

Whilst boys did not feel the program increased experience, teaching time, practice or curiosity in the machines, they did indicate that having the machines made them happier and increased their self esteem. For girls, although they felt the program did not increase familiarity as predicted, they felt their interest levels rose after having the computers.

**Technical Support**

When implementing an ILP, it is necessary for technical support to be available for users to help the program to work seamlessly. As each of the students involved in this study have realised, technical issues can be encountered by anyone at anytime. The way individuals go about dealing with this issue when and if it arises is a personal preference, as discussed below.

Overall, the results indicate that if technical support was required, both males and females had similar ideas about who they would depend on, stating that they would
choose from the combination of teachers, friends, or parents for assistance. Computer technicians were mentioned by one participant from each gender. Four girl participants and three male participants would also consider going to their siblings for help, specifically their male siblings.

Closer examination of the responses from student questionnaires and interviews indicates a majority of the girls said they would attempt to fix the problem before looking for help from other people, whereas most male participants said they would seek assistance first. All participants who mentioned they would attempt to fix it themselves specifically said that if they had no success then they would ask a parent or teacher.

One student, Hannah, talked about the different steps she would take to solve a technical issue, depending on the location she was in. If at home:

"I think I would try and fix it myself first and then if I really didn’t know I might ask one of my friends that knows it really well and then my mum or my dad last. If I am at school I think I would not really know what to do so I would just ask one of the teachers" (Hannah S2IQ13).

When questioned about why she would try by herself at home, but not at school she said she would ask my parents last:

"Cause I really want to try it myself before I ask them because if I go to them first it feels like I am not trying, I’、“m just asking” (Hannah S2IQ13).

Similarly, Andy and Wilson would take different steps to fixing the problem depending on where they were. Wilson would try to fix the problem himself at home before getting parental assistance but at school he would go straight to the teacher. This is because:

“I feel very cautious about this computer….I don’t want to do anything bad to it cause it is sort of a bit new….My home computer is getting very old now and I think if I have one try I can do it probably” (Wilson S2IQ13).
In contrast to this, Andy said if he was at school he:

"Would probably work it out because at school there are not really any complicated tasks" (Andy S2IQ13).

At home, however, he would also try to fix the problem before calling on anyone else.

In summary, the findings in this stage are congruent with those mentioned previously. Most participants would look towards their parents, close friends or teachers to assist them if they encountered a technical difficulty whilst using the computer. One difference that has surfaced over time is the number of children, particularly girls, who have shown a willingness to 'have a go' themselves, before asking for help. Furthermore, students have become aware of ICT technicians who can provide support if necessary.

**Language**

During the second data collection stage, it became apparent that language was a major obstacle in using computers, a factor that was possibly affecting student engagement.

During the interview stage, some of the participants demonstrated their awareness of specific computer language. Both Opal and Marcus spoke about their knowledge of shortcuts. Opal mentioned that she wished she knew more of them. Bianca, whose language and knowledge of technical terms was extremely sound, had a strong awareness about different types of formulas in *MS Excel*. Maryanne had a familiarity with a variety of different software packages, stating:

“I’m confident in *Word* and I’m not very good at the new *Word*, you know how *MS* was developed in 2003 first, well sometimes my mum gets the newest edition and I find that I am not very good at working out where the things are in the newest one” (Maryanne S2IQ6).

Gabby, Bianca and Wallace, observed during the skills assessment, appeared very competent with their understanding of different technical terms, such as shortcuts and formulas, and were able to describe multiple ways to complete certain tasks.
In contrast to those mentioned above, Hannah, Andy and Lara struggled to comprehend and/or describe many of the terms used in the tasks and questionnaires. When talking in the interview about different programs that she would like to be able to use, Hannah said with difficulty:

“Maybe there’s a program with all the pamphlets, MS um I don’t know what it’s called” (Hannah S2IQ14)

Overall, in the latter part of the study, it was apparent that students with a strong computer language base had a better understanding of what was asked of them and were able to articulate terms clearly. On the whole, girls were recognised as being more expressive than boys.

**Student Opinions**

**Personal Satisfaction**

One of the major concepts addressed in parent questionnaires, student questionnaires and the interviews, related to personal interest and enjoyment levels when using computers. The results indicate that, similar to the Stage One findings, both genders indicated they had high levels of personal satisfaction when using computers. A visual summary from the student questionnaires can be seen in Figure 8 below.

![Figure 8: Interest – Stage 2](image-url)
Supported by other data, Figure 8 indicates that all participants demonstrated or perceived themselves as gaining some level of personal satisfaction from using computers. Male participants were extremely positive, and all were able to articulate their interests and reasons for enjoying computers much more than the female counterparts. Furthermore, there was also a wider range of reasons for why males enjoy using computers.

Whilst most of the boys claimed that using computers was “exciting” (Andy S2IQ4), three of them also felt that “you can discover new things” (Aaron S2SQ2) and gain new knowledge whilst using them. One of the male participants said that they enjoyed using computers simply because:

“You don’t have to write. You can type” (Jason S2SQ2).

Another boy made an analogy to writing saying:

"You can do lots of stuff. There’s not just one option as with some things. Like with the other things you can just do one thing" For example "You can’t do anything else but just write. But when you are on a computer you can write Word documents and you can go on the internet, search websites, get information" (Marcus S2IQ4).

All female participants demonstrated some enthusiasm towards using computers, mentioning the ease of accessing information on the computer. Sarah said that she finds:

“It interesting that on the internet you can find so many different websites, that there is a website for everything you can think of” (Sarah S2IQ4).

Although from the parents’ perspective, Bianca is enthusiastic about using computers, she feels that:
“.If we spend three periods doing computers, I get bored. I find some things on the internet frustrating but I am not sure why. I enjoy using computers at home when I get to play games” (Bianca S2IQ4).

In summary, although all participants were enthusiastic towards computers, males were more expressive and extensive in their explanations.

Overall, in comparison to Stage One, there was a dramatic increase in most participants’ satisfaction levels with computers. Although females struggled to express their satisfaction verbally during Stage Two, it was evident that males changed their perspective from feeling that computers brought satisfaction through homework, games or research to gaining fulfilment by discovering new things or gaining new knowledge.

**Downsides of Computers**

Similarly to Stage One, participants expressed the drawbacks of using computers including the technical aspects of using computers such as “errors and viruses” (Andy S2SQ4), “viruses/cyber bullying” (Madison S2SQ4), “slow loading” (Wilson S2SQ4) or “deleting things” (Opal S2SQ4). One participant, Aaron was the only participant throughout the whole study who was concerned with his ability to use the computer and said he was put off by “not being able to do easy things” (Aaron S2SQ4).

**Usage**

In order to understand the ways students best engage with computers, it is important to find out what students use computers for, whether this is for educational benefit and how long they spend using this technology.

- **Time Spent**

When looking at student engagement levels with computers, it is important to take into consideration the amount of time students feel they spend on computers each week. In the data collection stage, both participants and parents were asked about the participants’ usage each week. Parents provided a numerical time figure, whilst students provided the number of days per week they utilized the machines, even though neither time nor day allocation was specified in the questions.
When collating the parent surveys, males were found to utilise the computer on average for four hours and forty-eight minutes per week whilst the girls’ average was two hours and thirty-six minutes each week. Both figures are significantly different to those in Stage One.

In the student questionnaires, male participants said they use their computer on average three days per week whereas female participants utilised them four and a half days per week on average.

It is difficult to make direct comparisons between these figures. At the low end of the scale in the male results, Aaron and Andy were restricted by their parents, using the computer for only one hour per week. Marcus however used his computer for 14 hours per week, which is more than ten hours beyond the maximum time of any of the male participant’s usages in this study, drawing the male average upwards. In addition, Hannah, the top female user, worked on her computer the most, utilising it for five hours spread over three days of the week. For Lara, the lowest user, it was claimed by her parents that she did not use the computer at all during the week. Lara however said, she used the computer daily. Although these statements are contradictory, they are important as they have influence on the female average.

Overall, it was found that these results were contradictory in relation to hours used versus days used. There is the possibility that this means girls use computers more often, but for shorter amounts of time whereas boys have an opposite pattern of use.

- **Common Uses**

This project is trying to examine student engagement within an educational setting. The interview, survey and questionnaire attempted to determine what programs these students used more often than others. When looking through the results collected during the data gathering phase, it was interesting to see the ways in which each gender utilised their computer.

All female participants stated that they used the computer for creative applications such as “writing stories” (Hannah S2IQ7) or the “2Paint program” (Madison S2IQ7). The next common uses for the computer for girls included playing games such as “Club Penguin” (Maryanne S2PQ3), researching on “Google” (Gabby S2PQ3) and
listening to music in “iTunes” (Hannah S2PQ3). In comparison to male participants, females mentioned that they utilise their email a lot more than males.

In contrast to girls, all boys mentioned games as the most common use for computers. When they spoke, there was enthusiasm in their voices when talking about games and they were able to discuss the types of games they play. Although Marcus and his parents indicated in the written responses that he plays games, he remarked in the interview, I do not normally play games because:

"There could be viruses. The only time I do is if [my teacher] gives them to me, like the eight letter word games and pop word, powerlines and other games like that. Education games" (Marcus S2IQ7).

Apart from games, the male participants also mentioned research, making animations, creative uses, and homework as other common uses.

In summary, analogous with Stage One data, information gathered from parents indicated that boys use computers on average for more hours per week than girls. In contrast however, from the student’s perspective, girls access the computer more often throughout the week than boys. There is no data from Stage One to support or contradict this statement.

Furthermore, the most popular activity on the computer for females is creative applications whilst males play games. The results showed that there was a significant difference in the number of females utilising their email accounts in comparison to males, an activity that was not regularly mentioned during Stage One. Activities mentioned in this stage such as creating animations and listening to music, were also not utilised previously.

**Ability**

Ability is a factor that can be easily attributed to student engagement. Students who are experiencing academic failure are less likely to be motivated to learn. Thus, an important theme that has arisen through the data collection period is the student’s perspective on their strengths and weaknesses whilst using computers.
• Perceived Strengths

Diversity became apparent when talking with each gender about their strengths when using computers. Similar to the findings in Stage One, most female participants mentioned simple tasks such as opening, saving, and typing as their strength, but struggled to give reasons or a description to explain this. Two girls spoke about their ability at:

“researching things off the internet, what particular websites to go on” (Gabby S2IQ8).

Another couple of female participants felt their competency lay with MS Word as:

“I know how to change the fonts in different colours and patterns” (Hannah S2IQ8).

One female participant, Opal, was unable to verbalise or demonstrate any of her strengths when using the computer, and did not speak or write positively about her ability in any of the analysis methods.

In contrast to the females involved in this study, male participants conveyed their strength and ability for more substantial applications on the computer, for example, “MS Word” (Max S2IQ8), as opposed to tasks such “saving and moving files” (Bianca S2IQ8) that were mentioned when interviewing females. The perceived strengths noted by male participants, became more complex throughout the study.

When Andy spoke, the extreme confidence he had in his capability to use “the different programs” (Andy S2IQ8) on the computer was very noticeable. He felt he had a strong understanding of “how they work” (Andy S2IQ8) and indicated that:

“When problems happen I can usually fix them, errors, viruses, stuff like that” (Andy S2IQ8).

Most of the other boys felt they were proficient at “emails” (Aaron S2IQ8) or “browse through websites” (Wilson S2IQ8).
Marcus felt he was talented on computers and used an anecdote from his past to explain how he helps others, his sister in this instance, on computer:

“She can’t do anything like that and I help her a lot” (Michael S2IQ8).

Although the male participants were the only gender who were able to talk easily about the reasons for their computer competency, both sexes were able to ruminate about their weak points with computers.

- Perceived Weaknesses

Indeed, the girls spoke effortlessly about their weaknesses. In the interview, they discussed a wide range of applications and processes in which they felt inept including “getting onto websites” (Jane S2IQ9), going on “Excel and using formulas” (Bianca S2IQ9) or “I can’t use attachments” (Lara S2IQ9) when sending emails.

In a more detailed explanation Gabby felt that:

"Sometimes some really complicated things we do in class like if [my teacher] wouldn’t have taught us that I wouldn’t have had much idea about how to do those things” (Gabby S2IQ9).

Maryanne and Sarah also felt their weaknesses came as a result of not being shown or taught how to use the application, and that they had little experience with the program:

"Probably the things I use the least which are MS Excel and MS Publisher, um, because I don’t use them a lot" (Maryanne S2IQ9).

When reflecting on the male responses from the interviews, two of the boys felt their Achilles' heel with computers was related to “finding out things that I don’t really know but I should know” (Aaron S2IQ9). Michael was a bit more elaborate in his description:
“Things I don’t really learn, like if for instance, if we are going to learn something next week and it’s something new, like how to use button cheats or shortcuts and I haven’t learned them, then I wouldn’t know how and I would sort of get stuck. But if I’ve heard it before then I know what to do” (Marcus S2IQ9).

The other participants had similar limitations to the females in the study, struggling with tasks such as typing, MS Excel or using emails. Wilson had difficulty using his emails and felt that:

“Sometimes when I am checking the emails I find it a bit tricky and I can’t find the right one" (Wilson S2IQ9).

Overall, female participants felt their strengths related to simple tasks such as saving and typing whereas males perceived their strengths as using MS Word and helping others, a pattern evident in both stages of data collection. In contrast to the diversity in the capability of males and females, the issues in relation to student’s inability were consistent across genders and stages of the project.

- Perceived and Actual Ability

In order to ascertain students’ capability, computer tasks were conducted in five different applications. Prior to this, students had the opportunity to complete a dichotomous survey in which they stated their ability. This survey has been analysed against the skills assessment conducted by the researcher. The results for female participants can be seen in Figure 9 below.
In the 24 computer tasks tested, it was noticeable that females overestimated their actual ability. All but three tasks having an equal or higher result than their perceived knowledge. It could confidently be stated that females feel competent with most tasks, but in reality can struggle to complete what is asked.

When working in *MS Word*, most girls (75%+) were able to complete more than 90% of set tasks. None of the girls were able to change the page orientation although 35% of female participants indicated they could. These findings were congruent with Stage One results.

Most problems for females occurred in *MS PowerPoint, MS Excel* and *MS Outlook*. In relation to the Internet task, there were similar differences between their perceived and actual ability.

Male participants also had an extremely strong impression of their ability, with all but two tasks having an equal or higher result than their perceived knowledge. Figure 10 below provides a visual representation of these results.
When working at tasks in *MS Word*, all boys could complete seven out of nine tasks, an improvement from Stage One (see Figure 10 below). Similarly to the girls, most male participants struggled with tasks in *MS Excel* and *MS PowerPoint*. Whilst all male participants successfully replied to an email, only 71% of those could not demonstrate further knowledge by attaching images or forwarding emails. All students were able to complete the task on the internet, a finding that is similar to the previous stage.

**Figure 10: Male Perceived ‘vs.’ Actual Ability – Stage 2**

When these Stage Two results are taken as a whole, both genders overestimated their ability in each of the five applications assessed. Figure 11 below provides a visual representation of the Stage Two results.
Figure 11: Overall Results – Perceived ‘vs’ Actual Ability – Stage 2

Whilst the overall results improved dramatically from Stage One, *MS Excel* and *MS PowerPoint* still caused the biggest hurdles for participants. An overall comparison of the results for participants’ actual ability can be seen in below (Figure 12).

Figure 12: Actual Ability - Stage 1 & 2
**Confidence**

One of the factors that affects student engagement is confidence. As one of the aims of this study was to see how engaged students are when using computers, it was important that confidence levels were observed and taken into consideration throughout the analysis process. Students’ confidence was measured in four different ways. Written responses about confidence levels of students were obtained from parents, ratings were obtained from students, observational data was collected during the computer skills test, and students were interviewed.

When asking children to rate themselves on a five point scale, over 70% of male participants rated themselves as four or five. In comparison, only 33% of females rated themselves at these levels. These results are shown in Figure 13 below. In comparison to Stage One, only one female increased her rating, whilst the remaining participants stayed the same or decreased their rating.

![Figure 13: Confidence – Stage 2](image)

When females responded during data collection, there was a discrepancy between the results collected from observations and written data and discussions. The information gathered from student questionnaires (shown above in Figure 13) indicates that most girls placed themselves in the middle of the scale. This is consistent with data collected from the interview, where most girls said “I think I feel confident in some areas, in others I’m not so good” (Maryanne S2IQ6).
Another comment that surfaced in many of the interviews can be summarised by Jane:

“I know how to do most things and I am not that incompetent with things. I am only incompetent with things when I have never done it before” (Jane S2IQ6).

These results are not consistent with the observational data, as most girls appeared to be self-assured when using the computer and indicate a contrast in behaviour from Stage One.

In comparison to the results discussed above, two female participants, Bianca and Gabby, said they were confident in using computers and justified their confidence level as being a “competent user” (Gabby S2PQ4) or “because I have been using them for a long time” (Bianca S2IQ6).

All the boys expressed high levels of confidence in their ability to use the computer, with justifications similar to those of the confident female participants. This finding was reliable as all responses from parents of the participants, the observational data and the numerical ratings supported these results (see Figure 13). These findings are also similar to those in Stage One.

Although all of the male participants were confident, Michael had a different explanation for his confidence levels saying that compared to most of his school friends:

I feel confident “when it is fast loading and when I feel safe on a website, when there is not anything bad about the website and that is when I feel confident. Sometimes I get a bit frustrated with the slow loading” which can make me feel less confident “because sometimes I keep clicking on the mouse to try and get rid of the slow websites” (Wilson S2IQ6).
He continued by stating that it makes him feel like it is something to do with him because of the slow loading time. Wilson stated that on the whole he did feel confident when using computers.

In conclusion, similarly to the Stage One findings, these results indicate that boys perceive themselves as confident computer users whilst most girls have lower levels of self-assurance. It appears however, from observational data and from parental perspectives that both sexes have high levels of apparent confidence. These findings are different from the results in Stage One

**External Factors**

**Parental Support**

One of the external factors that appeared to have influenced and contributed to the participants’ engagement with computers was their parents. Many of these children saw parents as playing a major part in their technological understanding and ability.

All parents of participants were able to use computers. Although both parents were capable, it was noticeable that four of the female participants’ mothers provided strong positive female role models in their house, whereas only one of the boys mentioned his mother’s ability as being superior. Overall, the boys said their fathers were the more proficient users of the computer. Irrespective of who was the most capable parent, both sexes had similar reasoning for this, with boys saying “he’s more used to computers” (Andy S2IQ11) and “he works on a computer almost every day” (Aaron S2IQ11). Only one participant, Sarah, felt that she did not have a strong role model in her house, indicating that learning was a joint experience where they “go through step by step how to do it” (Sarah S2IQ11).

Many of the girls involved in this study associated their parents’ ability with an increased use of the computer. In addition, they felt that those parents who use computers the most are often the ones who “whenever I can’t do something on the computer, he helps me” (Jane S2IQ11).
In conclusion, although some participants in this stage looked towards their mothers as role models when using computers, on the whole, participants commonly looked towards their father for support when using computers. This finding is congruent with the findings from Stage One.

**Sibling Influences**

In addition to the impact parents have on children, another external factor that affected students was the impact of other siblings. Several participants spoke highly of their siblings, specifically older male siblings, and often listed them as the first point of call if they encountered a technical problem. Wallace said he would:

"Ask my brother because he’s the only person in the family that knows more about computers than I do" (Wallace S2SQ6).

Another participant, Aaron, said he would ask either his brother or his sister. When asked who he would go to first he said he would ask his brother first:

"because he is older than my sister and he’s probably the one who sits home the most and who knows a lot about computers" (Aaron S2IQ13).

When discussing whether participants would ask their brothers or their mums first, Opal concurred with Aaron stating:

"My brother knows more than my mum!" (Opal S2IQ13).

As reported in the Stage One findings, the impact of older siblings appeared to have a strong impact on a lot of the participants, especially in relation to the acquisition of knowledge and computer advice.

**Aspirations of or for Friends**

Almost all participants considered other boys in Year Five to be superior in ability to female members of the year. Figure 14 shows the number of times each gender has been noted as showing skill with computers.
Figure 14: Assessing Others’ Ability – Stage 2

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Both sexes mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls involved in study</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Boys involved in study</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

All participants expressed their feelings easily when assessing another student’s ability, and there were a variety of responses, even if students were talking about the same student, for example:

"Greg...he was really good at helping our teacher...he is just really good at connecting the computer to the PowerPoint and if the ...projector is not working then he knows how to fix it" (Maryanne S2IQ15).

“Greg, well, he went around fixing everyone’s problems and he just, when we do things like slide shows, he will always have the best, he knows how to put music on it and knows how to get really good colours and effects and he’s just really good on computers" (Lara S2IQ15).

Most participants selected a male classmate who was considered to have superior computer ability. Both genders gave the reasons for this student’s superior ability due to their increased knowledge of the technology or because of the amount of time spent on them. Some boys also mentioned that this was because these leading computer users showed high levels of confidence or because there was a relationship between their and their parents’ ability when using computers.

The female participants thought that those selected were experts because they were able to help others and fix problems on the computer. One female student made the assumption that the other person was an expert at computers because "he’s smart, he’s in maths enrichment" (Opal S2IQ15).

One of the girls who selected both sexes said:

“Greg is good because he has lots of computers at home and uses them more. Isabelle is my friend and she helps me. She is a fast typer (Bianca S2IQ15).
When trying to determine the reasons behind the gender selection, participants were questioned about whether they felt that boys were better on the whole than girls, which provoked the following responses:

"I just think boys have a little bit more experience, cause girls don’t tend to play on the computer as much as boys" (Gabby S2IQ15).

“Usually. Well it depends on what group of girls and boys that you have. I think that it is possible for boys to be better than girls and girls to be better than boys and girls and boys to be equal too” (Sarah S2IQ15).

"Because girls are still good with computers in different ways but boys are somehow better by, they seem to show off a bit more, the girls just stay back" (Max S2IQ15).

"I don’t think that, it’s just because I have been in the class and with boys and with those and have just seen them more often. I am sure that girls are just as good” (Wilson S2IQ15).

Overall, when assessing others’ abilities, most participants selected male acquaintances. The common reasons were because of higher levels of knowledge, increased use, strong role models, and increased confidence. Although these findings were comparable to Stage One, being strong role models and having increased confidence were not identified as factors for competency in friends during that stage.

**Summary of Findings**

Throughout both stages of the research, five key findings have become apparent.

First, the findings identified in New Technology demonstrate that the ILP has improved computer ability, interest, confidence and increased usage. It has become evident however, that further consideration should be given to the ways in which computers are utilised in a classroom environment and educational settings to ensure that student engagement levels remain high.
Second, through collecting perceptions of ability and testing actual ability across both stages, it is evident that although both genders have significantly increased in their skill level through the ILP, females still have an unrealistic understanding of their actual ability.

Third, student opinions indicate that the ILP provides opportunities for students to increase usage of computers, which has come hand in hand with increased observed confidence and an increased interest and chance to explore the computer more.

Fourth, throughout the study, it became apparent that when students are in need of assistance, the majority of participants look towards other males for help.

Fifth and finally, the combination of ability testing results and interview data also indicated a relationship between increased ability and students with older siblings, especially older male siblings. These key findings will be discussed in further detail in the following chapter.
CHAPTER 5: DISCUSSION

Overview

Purpose of the Study

The importance of ICT in our world is evident within our society. Technology surrounds us and competency is required in order to function on a daily basis. As technology continues to develop, ICT will increase the impact it has upon our lives.

Although improvements have been made and there is continuing growth in the body of knowledge, research still indicates that children are growing up in a world where technology is biased towards a particular gender (Burke & Murphy, 2006; Cranmer et al., 2008; Gansmo, 2003). Concern surrounding those who will be disadvantaged, because they have not had the opportunity to acquire the skill set needed to survive in the ever evolving technological world, continues to be a pertinent issue (Cranmer et al., 2008).

As computers play a central role in our day to day living and are being employed within educational settings regularly, it is essential that we ask ourselves whether both genders are being provided with the same opportunities in ICT, and if males and females are leaving school with the same level of skills and abilities in the area.

This small study, informed by research reviewed in Chapter Two, explored the gender differences in student engagement in two diverse pedagogical environments. It examined whether unlimited access improves student engagement, in relation to a learner’s intrinsic motivation in terms of personal achievement, interest, and enjoyment (Jablon & Wilkinson, 2006) with computers and what impact this has on the current gender divide.

Summary of Findings

The data analysed in Chapter Four provided many insights into determining the impact of the ILP program on student engagement at this Independent Primary School. In summary, it was found that the laptop program increased these students’
knowledge, usage, access and ability in computers and enabled participants to gain new knowledge whilst being involved in the study. These findings were supported by the students’ feelings, as overall there was a dramatic increase in personal satisfaction, ability and time spent with computers. In addition, the results indicated that there had also been a change in the ways in which computers were used by each gender. Although interview and questionnaire findings showed participant confidence had not increased, observations indicated results on the contrary.

This study also discovered that if technical issues were encountered students were more willing to have a go at fixing the problem themselves, before asking for assistance from friends, family or teachers. However, students still continued to look towards males, whether at home or in the classroom, if they were unable to fix the problem or if support was required. The results also indicated that older siblings, especially males, played a key role in influencing students with computers.

These key findings will be discussed further in this chapter, organised under the subheadings of New Technology, Student Opinions, and External Factors.

**New Technology**

**Laptop Computers**

At the start of the research it was hypothesised that the ILP would make a significant difference to student engagement with computers and eliminate the gender divide. After analysis of the results, the findings indicated that the ILP had indeed increased knowledge, usage, access and ability, and provided new knowledge for students involved. It had, however, failed to mitigate the gender effects for these children, which are often experienced by minors in society (Harding, 1996; Gansmo, 2003; Stewart, 2004; Burke & Murphy, 2006). Although this study recognised that the ILP employed by this Independent School did not cause adverse reactions or extreme effects such as “hate technology with a passion” (Abbot, 2006, p. 40), this research highlighted a gender difference in ability and usage, in addition to a decreased level of confidence on average for participating females.
Within the results of the program mentioned above, one student involved in the study believed that the ILP did not have an immense impact on him, feeling the program did not benefit him because “we just sort of use it for typing up things and emails” (Max S2IQ12). This student’s perspective echoes Stager’s (2006) concerns for the employment of laptop programs in schools, and whether they are being utilised in the correct way. Research reported by Abbot (2006) and BECTA (2008a) complemented this boy’s feelings and Stager’s findings (2006), highlighting the importance of discovering the correct approach when working with laptop computers, to ensure that both genders are able to engage with the medium. If this male participant developed a negative opinion of the program as a result of the way it was utilised in the classroom, then the approach teachers take should be questioned. This is because students’ engagement levels could be hindered as a result of using the powerful vehicle solely for word processing and sending emails.

When participants were questioned about the downsides of computers, it became evident that they felt technical issues were the biggest drawback. Hu (2007) has previously recognised that this is another prevalent issue that teachers are facing as a result of this program. In her study, Hu (2007) indicated that additional consideration is going to be required when determining the best approach for educators to take when employing the ILP in their classrooms.

Dunleavy and Heinecke’s quantitative study (2007) found similar findings to Hu (2007). Although the ILP was working effectively within their school setting, the instruction for male participants was more effective. In their discussion and conclusion they were unable to justify this finding, and indicated that further investigation was necessary in order to explain and improve this result. Although the present study did not observe the different teaching styles and approaches used in the classroom, it may, as explained through the eyes of the child discussed above, have had a dramatic impact on the way students engaged with the computers.

Overall, it would appear that many of the considerations of the ILP come back to the issues that teachers are facing, especially in respect to the best way to employ the ILP to ensure that students are engaged. Furthermore, teachers need to be provided with
strategies to help them deal with the technical issues that constantly arise for students when working on computers.

**Technical Issues**

Although there is limited research surrounding technical issues and the way students cope when faced with a computer problem, the research of Markauskaite (2006) with pre-service teachers, Bunz et al. (2007) with university students, and Bain and Rice (2006) with primary age children, all support the results reported in Stage One of this study. It was found that most males would try to fix the problem themselves whilst girls would look for assistance. When examining the students in Stage Two of this project, both sexes, especially females, demonstrated that they were now more willing to have a go at fixing the problem themselves before asking for assistance from friends, family or teachers. This represents a fundamental shift in attitude from Stage One to Stage Two.

Markauskaite’s (2006) explanation for the ways in which each gender approached technical issues was in terms of the student’s specific learning style, a reason that could be true for the findings of the initial stage of this project. In comparison to the Stage One findings, in Stage Two most students changed their responses and indicated that they "would try and fix it myself and then if that doesn’t work I would ask someone” (Jane S2IQ13). This change in willingness to have a go could be correlated with their increased usage or, for some, their increased confidence levels, rather than their learning style.

After six months of being involved in the ILP, some participants also mentioned there was a difference in their interest in fixing technical issues themselves, depending on their working environment. Although there was no pattern to these responses, connection was made back to the perceived difficulty and/or teaching approach to the ILP, stating they "would probably work it out because at school there are not really any complicated tasks" (Andy S2IQ13). This again supports Stager’s (2006) advocacy of providing an engaging ILP in schools.

Overall, after six months of being involved in the ILP, both genders showed a willingness to fix their computer if they encountered any technical issues.
Language

“Knowing how language works is, of course, useful to knowing how to use it better” (Winch, Johnson, March, Ljungdahl, & Holliday, 2004, p. 275). Throughout this project, computer-specific language surfaced as being a major obstacle with the ILP. When teaching children about a particular book or a piece of writing, it is important that they understand the meanings of certain words, such as characters or orientation, to help them become more effective authors and readers. The problems with the ILP will persist unless educators spend the time “providing teachers and students with a shared metalanguage,” (Winch et al., 2004, p. 275). If you fail to understand the computer-specific language then you will struggle to excel at using computers, let alone want to do so. As noted by Winch et al. (2004, p. 278) “at present we are mostly concerned with print literacy, but the children of the future need to have computer literacy” to enable them to function in our world today.

During the interviews in Stage Two, it became evident that the computer-specific language used with all of the participants disadvantaged some, especially females. Through a lack of knowledge of the metalanguage, this either prevented them from explaining the things they knew how to do on computers, or from understanding tasks that they may have known how to do if different language was used or a different explanation was given. Again, this reinforces the need for teachers to carefully consider the approach used with the ILP and the need to explicitly teach the computer-specific language to enable the ILP to be accessible to all.

Overall, although the new technology provided for these students enabled usage and enjoyment levels to increase and improved their ability levels, there were other issues that still needed to be addressed, such as a decline in confidence levels and language barriers, to ensure that the ILP was inclusive and engaging for all students.

Student Opinions

Personal Satisfaction

BECTA (2008a) reported that when ICT is incorporated into education, student motivation increases. Although this is true for both genders, there is a greater difference in relation to boys’ motivation. This finding has also surfaced in the
current research, showing that increased computer usage comes hand-in-hand with increased interest levels. Similarly, the results of this study also indicated that, although both genders increased their level of interest, boys still demonstrated higher levels.

When examining students’ levels of personal satisfaction, both genders were found to have positive attitudes, a finding which supports the work of Sanders (2005), Bunz et al. (2007) and Meelissen and Drent (2007). Saying this however, boys were more positive towards computers according to the five point rating scale, illustrating that although the ILP had raised overall satisfaction levels, this program had not narrowed the gender divide. As Passey et al. (2003) highlighted, although the gender divide has not narrowed and whilst boys gave a higher rating than girls, the rating given by female participants did not place them at a disadvantage. Because many of these papers include teachers’ perspectives in their findings, it is difficult to make direct comparisons with this current study, which was based entirely on parent and student opinions.

The rationalisation that was provided to help explain the numerical value representing participants’ satisfaction levels with computers changed for males throughout the ILP. They changed their perspective from feeling that computers brought satisfaction through homework, games or research to gaining fulfilment by “discover[ing] new things” (Aaron S2SQ2) or gaining new knowledge. This is analogous to results of Passey et al. (2003) where participants developed a more sophisticated understanding of the opportunities the computer can provide throughout the course of their study.

One of the most significant conclusions made by Meelissen and Drent (2007) was that attitudes towards ICT are not only influenced by the technology itself, but also by the way the machine is utilised. For some of these students who expressed frustration with using computers, for example Bianca, who found computers boring when they were used for longer periods of time, further consideration needs to be given to the way computers are implemented within the classroom setting.
Ability

- Perceived Ability

When given the opportunity to predict their ability, both genders misjudged their actual skill level. These findings strongly contradict those of Li and Kirkup (2005), Hargittai and Shafer (2006), Redmond (2006), Timms et al. (2006) and Meelissen and Drent (2007), as the results from the perceived ability dichotomous survey in this study when compared to the actual ability testing clearly demonstrate that females overestimated their ability during both stages of this research. These previous studies found that females will underestimate their actual ability. It is important to recognise that the males in this study also overestimated their ability. As many studies (Li & Kirkup, 2005; Hargittai & Shafer, 2006; Redmond, 2006; Timms et al., 2006) focused on the females’ perspectives, no comparison to earlier research can be made with the males’ findings.

One study (Bain & Rice, 2006), complemented the present results and found that both genders had a positive perception of their ability while also finding that females positively perceived others’ abilities, an aspect that was not incorporated into the present research.

It was interesting that Timms et al. (2006) found that even when girls’ perceptions did not line up with their actual ability, females became disengaged by computers. As females’ interest levels were high, and showed improvement throughout the current study, participants’ misaligned ability perceptions did not have an impact on their utilisation of the computer.

A pattern evident throughout both stages of data collection, showed that female participants felt that their strengths related to simple tasks such as saving and typing, whereas males perceived their strengths lay with using MS Word and helping others. As many of the studies examined in Chapter Two failed to investigate how students verbalise their explicit strengths, more investigation is require to better comprehend the impact of students’ perceptions on their actual ability levels.
• Actual Ability

The Department of Education, Science and Training (2002), Craig (2005), and Mitchell (2006), found that inequality exists between genders in relation to ability levels with computers. On the other hand Bunz et al. (2007) and BECTA (2008a) found that some of the girls involved in their studies had superior ability to males. Although both genders made dramatic improvements in their computing ability during this study, the results still indicate that girls did not show mastery in the tasks conducted and boys definitely showed superior skill levels (Hargittai & Shafer, 2006).

Once again, although most of the studies discussed in this section highlight gender difference in their results, researchers have had difficulty in explaining the reasons behind this difference, with most research papers indicating that further studies in the area are necessary to determine reasons behind the disparity (Dunleavy & Heinecke, 2007). In relation to this study, one possible reason for this discrepancy in ability levels surfaced during an observation of the skill assessment. Many of the female participants failed to understand the language used to describe a task. If the language used was simplified or if students were given support in learning the appropriate terminology to help them complete the set tasks, the effects experienced by the different genders may be minimised.

Confidence

For many years, males have demonstrated higher levels of confidence than females in the ICT field (Sanders, 2005; Bain & Rice, 2006; Wilkes, 2006; Bunz et al., 2007). In this study, the results are comparable, as the males demonstrated higher confidence whilst some female respondents reduced in confidence over time.

Revisiting the data brought into question the validity of utilising the Likert scale, particularly with minors. As Likert (1967, cited by MacGregor, 1999) himself has questioned, measuring variables such as personal opinions is challenging because a rating such as ‘strongly disagree’ can have “different meanings for different people” (MacGregor, 1999, p. 5). Participants in this study may have responded so that they felt positive about themselves or because they felt like they were being tested, rather than expressing their true opinion. Furthermore, the students may have also had
difficulty understanding the question they were asked. These limitations surfaced throughout the study, causing an inconsistency in the results from different data collection methods. When students were observed, or when parents’ perspectives were taken into consideration, both genders showed high levels of apparent confidence.

In 2006, Hargittai and Shafer’s study involving university age students also found discrepancies between confidence levels, suggesting that males have higher levels of confidence due to their perceived ability levels. Although examining different age ranges, parallels can be drawn with these results, as females in the present study made reference to capability when describing their confidence levels stating:

“I know how to do most things and I am not that incompetent with things. I am only incompetent with things when I have never done it before” (Jane SQIQ6).

Additionally, although this study did not ask students to discuss times when they felt confident or when they were lacking in confidence, one male, Michael, commented on the running of the computer and cyber-safety as things that affected his confidence levels. This challenges the findings from Markauskaite’s study (2006) where it was found that technical concerns gave males high levels of confidence.

**Usage**

- **Time Spent**

In the past, several studies (Chalmers & Price, 2000; Timms et al., 2006; Wilkes, 2006; Leech, 2007) have highlighted issues in relation to usage and the availability of computers. Leech (2007) found that males dominated computer labs and received most of the assistance in computer classes. As each student had availability and constant access to a computer, these issues were not an obstacle for students to overcome in the present study. Additionally, teachers and teaching time were not incorporated into this study, and thus it is difficult to make comparisons to Leech’s study (2007).
Nevertheless, when examining time spent on computers, results from the present study are analogous to research by Volman and van Eck (2001), Li and Kirkup (2005), Hargittai and Shafer (2006), Markauskaite (2006) and Meelissen and Drent (2007), as all these studies found that boys are heavier users. In saying this, however, different usage patterns have been observed throughout the study. Even though the student questionnaires indicated diversity in the Stage One results, in Stage Two it was found that females actually used computers more often than males but in short sharp bursts, whilst males used computers less often but for longer periods of time. Although usage was not the central focus of this research, it would be beneficial to further examine the patterns in usage and the impact this has on student engagement, especially in relation to lesson planning for educators.

- **Common Uses**

Redmond (2006), supported by Li and Kirkup (2005), Bain and Rice (2006), BECTA (2008a) and Meires (2009), also found that the most common activity for boys on computers, that is games, parallel those in this study. For girls however, the uses such as talking on chat rooms, browsing online magazines and shopping online, as found in Redmond’s study (2006) do not align with this study.

In comparison to, Bain and Rice (2006), Hargittai and Shafer (2006), BECTA (2008a) and Meires (2009), there was a significant difference in this study in the use of email, with girls communicating more than males. This finding has only become apparent as a result of the ILP, demonstrating the effect this program makes in changing the way computers are used. It should be noted, however, that developmental change occurred in the children throughout the study, which may have also contributed to this variation.

Another change in usage that occurred after the ILP was introduced was the students’ use of computers for interactive purposes, such as games, which draws parallels to the findings by Hollingworth et al. (2008). BECTA (2008a), who found games to be one of the highlights of male computer use mentioned however that games are monotonous for girls. This does not support the findings from this study as during Stage Two girls showed high levels of interest in using computer games. Although both genders utilised games on their computers, as Li and Kirkup (2005), Bain and
Rice (2006) and BECTA (2008a) also found, boys tended to use games more than females.

In addition to the use of games, the findings of Cranmer et al. (2008) were similar to those that surfaced in Stage Two here. When students had more experience with computers, boys started to utilise the computer for animation, whilst girls were involved with musical applications.

Overall, although the participants’ usage and interest levels increased over the duration of the project, differences between genders still exist in the sophistication of usage, usage patterns, interest levels and perceived ability thus contributing to each gender’s level of engagement with computers.

**External Factors**

**Support – Parental and Friends**

Redmond (2006, p. 17) stated that “girls require a number of ICT using female role models. The direct and indirect contact with positive ICT role models will assist in dispelling inaccurate images of computers”. In a Dutch study Meelissen & Drent (2007) looked at role models in the home environment. Males used computers more. As with this study, when support was required, although both family members were competent with computers, students continued to look towards males. This is true for the classroom environment as well. This is another difference between the findings in this study and those of Redmond (2006).

Sanders (2005) conducted a significant study with over 650 sources of information, and found that parents play a significant role in their children’s lives and can influence the way they feel about computers. This finding was reflected in the current study, as there was a connection between mothers who were the primary user of the computer and female students who had a high ability and interest in using the computer (Redmond, 2006). Although a few associated their mothers as being able users and looked to them for support, most of the students asked their fathers as “he’s more used to computers” (Andy S2IQ12).
Once again, the implementation of the ILP did not make a dramatic impact on who they turned to for support at home. Despite all of the participants’ parents being able to use computers, there was still a strong message emerging that males are the more competent users of ICT in the home and that students prefer to ask a male figurehead in the house if assistance is needed.

This may explain why children turned towards their teacher for support in the classroom, especially as most students had male teachers in Stage Two of the study. It would be interesting, however, to fully investigate why children look towards males as the primary helper when assistance is needed.

**Sibling Influences**

In addition to the role parents play, the results also indicate that older siblings, primarily males, play a key role in influencing students with computers. Although most of this impact could be attributed to a strong relationship between the participant and their older male sibling, this research indicated that students are benefiting from this relationship.

When looking at the ability, confidence and interest levels of those students who have older siblings, it is noticeable that the students with the highest individual overall ‘rankings’ all have older male siblings (See Figure 15 below). Due to a gap in literature in this area, a comparison cannot be made to previous studies. In saying that, however, as Sanders (2005) and Meelissen and Drent (2007) stated in their studies, males play a significant part in children’s lives with computers in the home.

It was mentioned previously that Redmond’s study (2006) suggested that females, and on the basis of this study it could be argued that all genders, need a role model. Older siblings, and specifically older male siblings, could play a positive part in students’ acquisition and development of computer skills. Although further study would need to be conducted in the area to recognise the full effect of these relationships, if successful, investment could be made in developing relationships with older student ‘mentors’ or older siblings who are passionate about computers as one way of helping to achieve gender equality in the computing world.
Student Engagement with Computers

Overall, the margin of difference between males and females in the areas of interest and ability decreased with the introduction of the ILP. Confidence levels and usage patterns, however, did not show any diminishing gender gap, thus the suggestion of Chalmers and Price (2000) could be questioned about whether providing equal access actually diminishes the gender divide.

Another educationalist, Redmond (2006), assured readers in her Australian discussion paper that increased access would increase skill level and experience and thus improve attitudes. As mentioned throughout this chapter, this research project has shown that the ILP successfully increased skill levels and experience, and improved attitudes, and therefore both genders have benefited from the increased experience and opportunity provided by the ILP. The problem however, is that once again,
gender differences persist. This raises the question: if the individual laptop program improves usage, ability, access and enjoyment levels, how do we overcome the gender divide that has surfaced throughout this project?

With this question in mind, whilst examining the findings and making comparison with current research, questions arose as to whether the model of engagement discussed at the beginning of the thesis was sufficient to support the ILP and produce the best results for both genders. At the beginning of this research, the definition of engagement appeared adequate to establish whether students were gaining maximum value from the ILP, as well reducing the apparent gender difference discussed in previous research (Department of Education Science and Training, 2002; Colley & Comber, 2003; Craig, 2005; Department of Education Science and Training, 2005; Mitchell, 2006). In hindsight however, if this model represents how students best engage with computers, there should not be any pattern of gender difference. This raises questions for the research as to whether there is something else that students need in order to gain the best out of the ILP and in a simplistic way, gain equality in order to function equally in our society.

Given the themes that have come out of the findings, in combination with the three aspects of engagement as established by Marks (2000) and supported by the findings of Jablon and Wilkinson (2006), namely interest, personal achievement and enjoyment, it is the contention of this research that the following new model of Engagement – the Cognitive, the Volitional and the Emotional – needs to be addressed in an ILP classroom in order to provide a successful program with minimal gender difference. This belief will be discussed and justified in the following paragraphs.

Throughout this study it became evident that Cognition was an important factor in engaging with computers. Students who were able to memorise things completed in class, to make judgements about dealing with viruses, and to think of different ways to utilise the computer, were definitely those students who were more capable with computers. These students made the conscious intellectual decision that they wanted to learn about computers. Students such as Lara, who clearly demonstrated throughout each of the stages apathy towards computers and a clear disdain for
learning about them, results were on par with her cognitive ability. Towards the other end of the scale was Aaron, who established his ability to memorise shortcuts and learn new computer language, and demonstrated his understanding of many different ways to navigate around the system. He was therefore an able user of the computer.

Another essential ingredient that is necessary for students to be fully engaged with computers is via students’ positive emotional development. This includes students having the confidence to try new things, having a strong self-perception, and having the ability to deal with the frustration that may come with learning new things. Students such as Gabby, Jane and Will, who demonstrated high levels of observed confidence, and who attempted tasks and persevered irrespective of the difficulties they were faced with, succeeded far more than other participants involved in the study.

Volition, although a cognitive process, is defined as "a collection of dispositions and self-knowledge that predisposes and enables persons to anticipate, choose, experience, and interpret their occupational behaviour" (Kielhofner, 1995, p. 30). It is the act of willingness of an individual to commit to a decision. Volitional processes can be applied consciously and can even become automated.

The volitional process became evident throughout this research as some students needed to be coerced into using the computer, whilst for others the willingness appeared intrinsic. One student, Bianca, who succeeded in using the computer in relation to the Cognitive and the Emotional perspectives, said in both stages of the project that she did not like computers “that much. If we spend three periods doing computers, I get bored. I find some things on the internet frustrating” (Bianca S2SQ4). This had an impact on the way she responded during the data collection stages as she required some convincing to use the machine. Students such as Bianca, who needed help to maintain enthusiasm with using technology, may be left behind, where in a normal classroom environment one-to-one tuition is not available. Students need to make the choice to want to use computers.

Thus, it is essential that classroom teachers, policy makers and education providers ensure that from a young age, computers are promoted and valued in society by and
for both genders to ensure that students have the motivation and are then willing to use computers. If we can help filter the message through future generations, then this Volitional Development will become natural, and students, although conscious of what they are doing, may feel that computers are just a part of life.

It is the contention of this study that in order to fully engage with computers, students need to make a conscious decision to involve themselves intellectually, and to feel inspired by the technology rather than to be hindered by emotions. In this way, appropriate decisions for each gender can promote equal functioning in our ever changing world.

The evidence presented above can be used to further the current knowledge on technology in education for classroom teachers, policy makers and education providers. In addition, it can be used to make suggestions for further research that could contribute to the area of technology education. These suggestions will be discussed in the next chapter.
CHAPTER 6: CONCLUSION

Prior to the undertaking of this study, a review of published research was conducted to help better understand the current knowledge in relation to gender differences in ICT. The review showed that females were disadvantaged in the field, being isolated from access.

Within the context of one co-educational primary school, this study aimed to answer the following question:

*What impact does the laptop computer program have on gender differences with engagement in the primary classroom?*

**Answering the Research Question**

As this study set out to answer the research question based upon Marks (2000) and Jablon and Wilkinson’s (2006) definition of Engagement - personal achievement, interest and enjoyment - it is essential that it is answered in relation to each of these defining factors.

Whilst both genders made improvements throughout the study, personal achievement levels of male participants increased more than their female counterparts. Both genders misjudged their ability levels when given the chance to predict their aptitude with computers, a finding that contradicts other studies in the area (Li & Kirkup, 2005; Hargittai & Shafer, 2006; Redmond, 2006; Timms et al., 2006; Meelissen & Drent, 2007).

Another factor of engagement, student’s enjoyment of using computers, presented significantly positive results. Although males still demonstrated higher interest levels, attitudes towards computers from both genders indicated that they enjoy utilising the technology (Sanders, 2005; Bunz et al., 2007; Meelissen & Drent, 2007).

In addition to enjoyment levels, these children demonstrated high levels of interest towards computers. Throughout the research, students’ levels shifted in the programs
they showed interest in. Initially, males and females demonstrated an interest in games and creative applications respectively, which changed to growing interests in animation and musical applications.

Overall, although the results of this study indicated positive association for both genders in relation to personal achievement, enjoyment and interest levels, gender differences still exist. Consequently, further consideration needed to be given to additional themes and knowledge that arose in this project to help find the best way for gender equality to be reached in the future.

**New Knowledge and Themes Arising**

In addition to the defining factors mentioned above, new themes emerged throughout the study. These included the impact of new technology, students’ opinions and the external factors that influence students’ attitude towards computers.

The data analysed in the area of New Technology demonstrated that the ILP increased usage, access and ability, and enabled participants to gain new knowledge whilst being involved in the study. Furthermore, there were changes to the ways in which the computers were utilised; for example, females began to use email more. Although reluctant to deal with computer malfunctions during Stage One, if students encountered technical issues after six months of being involved in the ILP, they were more willing to have a go at fixing it before asking for assistance.

Evaluation of the raw data showed that there was a dramatic shift in the area of Student Opinions, as personal satisfaction, ability and the time spent using computers increased. Additionally, observations indicated that student confidence levels increased.

Under the theme of External Factors, it was confirmed that older, especially older male, siblings played a significant part in influencing students with computers in this study. If assistance was required, most students looked towards males.

Through these new themes, a new model of Engagement – the Cognitive, the Volitional and the Emotional – was introduced as a way of ensuring that students are
highly engaged with this powerful medium of computers. If teachers help students by giving them the confidence, the interest and the desire to involve themselves intellectually with using computers, gender equality with ICT might be achieved.

**Recommendations**

Based on the findings of this study, the following recommendations are made for the consideration of policy makers, educational providers and classroom teachers. In addition to the new model of Engagement – the Cognitive, the Volitional and the Emotional – that needs to be addressed whilst implementing an ILP, this study has also highlighted the importance of providing appropriate advice and support for all involved in the ILP. This includes relationships, having support structures in place, providing appropriate language reinforcement and ILP implementation scaffolding for teachers.

It is essential that a school considers the relationships between the teachers, students and parents prior to implementing an ILP. This triangle is fundamental in allowing students to excel at computers. If any of these three elements of the triangle lack the appropriate knowledge, value of or interest in computers, then the ILP will struggle to operate to its true potential. We have seen a strong connection during this research between participants and certain role models in their lives. This connection confirmed a correlation between students’ interest, ability and confidence levels and the type of role model they have at home, or in the classroom. If students can look towards other siblings, parents and/or teachers who have a strong background in technology, there is a higher likelihood of them placing importance on ICT as a result of those connections.

Furthermore, when implementing an ILP, it is crucial that there are educators available who students can go to for support. In addition, it is important that students have the confidence to access these support networks. In this study, many of the participants were unable to complete tasks required of them because they did not know how to fix certain problems that arose or did not know who to go to for assistance. If students were aware of support structures available to them, they are more likely to use them for assistance.
In addition to the support structures and relationships with mentors, it is also essential that computer specific language is taught alongside the content. As this study highlighted, many of the students, particularly females, were left behind or unable to complete tasks due to their inability to comprehend the computer ‘jargon’ that accompanied the task. Although some students, predominantly males, appeared to have an innate ability to acquire this without any direct instruction, others fell behind because they were unable to comprehend the tasks and lacked the confidence to ask for an explanation. Further study is recommended to determine how to improve awareness of or make changes to the incomprehensible idiom associated with computers.

Lastly, Stager (2006, p. 45) highlights that the ethos of the ILP program is to “empower students and challenge every school convention to do with curriculum”. There is danger of this ethos being lost due to the immediacy of the implementation, technical problems and integration with the classroom program. Not only do teachers need to be proficient users of ICT, they also need to have a firm grasp of the language of computers, and a thorough understanding of the ways in which the computers can best engage students through meaningful tasks, and they need to ensure that they are catering to students’ specific learning styles (Markauskaite, 2006). This is an enormous expectation to place on our teachers! Thus, if the ILP is the future direction for educating students, investment needs to be made into educating teachers so they can help to ensure that the gender divide is not amplified further and can be reduced from where it is today.

**Strengths and Limitations**

**Strengths**

One of the strengths of this project was the triangulation of data sources, a process that “increases credibility and quality by countering the concern that a study’s findings are simply an artefact of a single method” (Patton, 2002, p. 563). Gaining perspectives from parents and children involved in the study, in addition to the observations conducted by the researcher, ensured that rigour and breadth were achieved.
Another strength of this project was the researcher’s ability to prevent her predisposed views from impacting upon the results or outcomes of the project. The researcher clearly stated the hypothesis at the beginning of the project and, although there was a predicted outcome, all the methodological and analytical processes were followed without this in mind. The results were not as expected and challenged the researcher’s initial perspective, indicating that her potential bias had not affected the outcome of this research.

**Limitations**

In every piece of research it is important that limitations, from both the methodology and the content, are taken into consideration. One limitation in the methodology here was the time frame allocated for this project. Although some changes occurred over the six months, more value may have been added to this project if students were observed over an entire school year.

Another limitation in the methodology lies with the size of the project. It is essential that readers understand that this project is only “one person’s encounter with a complex case” (Stake, 1995, p. 123). Case studies are not the desired approach when researchers want to make generalisations, and thus one has not been made here. If further research was conducted, it would be important that more participants were involved and that the methodological approach was examined, if a generalisation was required.

This study did not involve seeking teachers’ opinions. This caused limitations when trying to make comparisons with previous research. Taking into account each of the teachers’ opinions is another important consideration for the future.

In relation to the content of the project when working with children, it is important that thought is given to the involvement of the researcher in the children’s responses. During an interview, stories told by children may not make sense to the interviewer as “the meaning systems of children are different from those of adults” (Fraser, 2004, p. 826). Thus, the interviewer may be tempted to introduce words or concepts to help the child’s story make sense, which the child is likely to accept, but which may not represent the message the child was trying to give. In addition, the child could also look towards the interviewer for answers, or might only be echoing their parents’
opinions, and so once again, would not give an accurate representation of their opinion (Fraser, 2004).

Another limitation that should be taken into consideration when examining the results of this project is the child development and growth that has occurred between the two stages of this project. According to Piaget’s Theory of Cognitive Development, students should have been at the ‘Concrete Operational’ stage whilst the research was conducted (Woolfolk, 2001). However, some children could have moved to the ‘Formal Operational’ stage of development during Stage Two, enabling them to have more concern regarding social issues and providing them with more logical problem solving ability (Woolfolk, 2001), which may have altered their responses, self concept and interests.

**Research Implications**

This study has recognised the strong impact computers have on children in the classroom. It has also established that irrespective of the level of access students have to computers, engagement and gender differences still exist.

It is recommended that further research be conducted utilising the new model of Engagement – the Cognitive, the Volitional and the Emotional. As this study has been conducted solely with students from the independent sector, conducting a broader study that encompassed students from schools from low, middle and high socio-economic status areas would enable a broader perspective on student engagement with computers. By comparing these diverse environments, conclusions could be drawn regarding the subsequent implications for students’ learning, as well as their integration and functionality with computers in their adult life.

In addition to this potential for future research, exploration into the effects of language and computers and the impact of older mentors, even older male siblings, on student engagement with computers would be beneficial.

**Changes as a Result of the Findings**

When looking carefully at the implementation of the ILP at this independent school, the increased knowledge that has been gained through this research project will
impact upon the approach taken in my Year Five classroom. More emphasis will be placed at the commencement of the program upon the language used in conjunction with the ILP, with the overall aim for the development of an ‘explicit computer language’ that all children involved in the program will comprehend.

Furthermore, a buddy system will be initiated with the Year Six students who have had a year of experience with the technology, enabling peer support during the early implementation stages of the ILP. This buddy system will continue casually throughout the remainder of the year, to enable these students who are new to the ILP to have access to support and tutoring when and if required.

**Recommendations to Reduce the Gender Gap**

The aim of this research was to try and make ICT accessible to all and to make sure that each student had the opportunity to have equal access to technology. The hypothesis was that by providing students with the opportunity to participate in the ILP, the issue of competing for a computer would be removed and thus their engagement levels would be high.

After completing this longitudinal case study, although the new model of Engagement – the Cognitive, the Volitional and the Emotional – will make a significant difference to the gender divide, as this research has demonstrated, it is essential that those involved in education look at the small things that can be done to try and eliminate the gender divide.

First, it is essential that teachers, especially females, are supported with the appropriate scaffolding, to ensure they feel confident in using computers in classrooms. Teachers need to be aware that they need not know everything about a computer however, they need to show that computers are a valid tool and that they provide an important and exciting way to function in society.

Second, it is important that a collaborative environment is created in the classroom and at home so both genders are able to work together and develop their knowledge with technology. The current research shows that by having access to a support
network, both genders are more likely to succeed and feel inspired to learn more with ICT.

Most importantly, in order for equality to be achieved in classroom, this study has recognised that a common technological language needs to be spoken. In English, although there are multiple ways to describe feelings when we are happy, from a very early age we are taught all of the terminology to help us do this. With the vast vernacular associated with computers, it is no surprise that some of our society is being left behind! The current study has demonstrated that all of these recommendations need to be considered in order to help eradicate our gender divide.

**Final Statements**

As Storelli (2001) indicated, the intended outcomes of the individual laptop program are to improve student motivation, address individual learning needs and develop critical life skills. In this setting, it is evident that the overall aim of this initiative has been achieved however, we are left to question the added benefit that could be felt if this new model of engagement was applied when utilising an ILP.

In conclusion, although the ILP has been found to improve students’ enjoyment, interest and ability levels with computers, the gender divide has not diminished. In an attempt to help this minimise this gap, a new model of Engagement – the Cognitive, the Volitional and the Emotional - has been proposed. Each part of this model should be addressed when implementing the ILP in schools. By employing this model, along with tight home-school relationships, appropriate support networks, the use of explicit language, and sufficient teacher education, gender inequality with computers will hopefully fade into the background.

As a final thought, this thesis confirmed the belief that computers are important and that they can make a difference in our lives.

“But to make that difference — and this is more true today than ever before — you have to be open to change. You have to be ready to adopt new ideas and recognise new opportunities. Of course, not everyone will embrace these changes. But for those who do…” (Apple, 2010, ¶1).

…endless possibilities exist.
BIBLIOGRAPHY


Plain Language Statement

Project: “Individual laptop computer program and student engagement”

Introduction

My name is Laura Morris and I am a Master of Education student at The University of Melbourne. I am currently conducting a case study which aims to examine differences in engagement with Information and Communication Technology (ICT), with a specific focus on gender differences.

Research suggests that girls and boys respond to computers in different ways. This study aims to examine whether these differences exist in a normal classroom situation.

For my research project, I am being supervised by Anthony Jones, Lecturer in ICT in Education, University of Melbourne and David Beckett, Associate Professor, both staff members in the Melbourne Graduate School of Education.

What will you be asked to do?

This study will require the participants to complete a short questionnaire which includes a skills test on various computer-based activities to ascertain their familiarity with aspects of ICT. These activities will be completed on the classroom computers and, in Year 5, on the student’s personal computers, using programs they may have had prior experience with in a normal classroom environment. In addition, if students participate in the second phase of the study in year 5, they will be involved in an interview.

Although most of this research will be conducted within the classroom and in normal class time, the students may be removed from the classroom teaching for an interview and discussion, but only for up to 15 minutes. We do not envisage any emotional or social risks to participants.

Parents will also be required to complete a short questionnaire which would take approximately 5-10 minutes to complete.

How will the data be collected?

The data will be collected in the form of written information and verbal discussions. Written information will be collected on as an attempt to establish the effect the laptop computer program has on the group between two phases of the study. Verbal discussions, in the form of interviews will be conducted with each child involved in the second stage of the study. The discussion will involve students talking about their interest and engagement with computer based tasks and any problems they encounter when using them. These interviews will be tape recorded to ensure I have an accurate understanding of the discussion.

How will your confidentiality be protected?

All information collected will be confidential. No names of the school, student or families will be recorded or reported. As this is a small study, although pseudonyms will be used, students may be able to be identified by other participants in the study in the final report.

At the completion of the project, all data will be kept in a secure environment for the period of 5 years and destroyed after that time.

How will I receive feedback?

Once this research has been completed, a copy of the summary may be available for you to read through the Department of Education at Melbourne University. It is possible that the findings of this study may be presented at various conferences.
Will participation prejudice me in any way?

It is important that you understand participation in this program is completely voluntary. You are able to withdraw from the study at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied.

How long will the study take?

This study is planned to commence in Fourth Term 2008, during 6th October to 4th December. The intended completion date will be in Second Term 2009, between the 21st April and the 19th June.

Where can I get further information?

Should you require any additional information, or have any further questions, please do not hesitate to contact me on 9865 7841.

This project has received clearance from the Human Research Ethics Committee at the University of Melbourne. Should you have any concerns, however, about the conduct of the project you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 8344 2073.

How do I agree to participate?

If you are willing for your child to participate in this study, please fill in and sign the consent form attached, and return to Laura Morris before Friday 29th August 2008.

Ms. Laura Morris (Masters Student)
Ph: 9865 7841
Email: lemorris@mgs.vic.edu.au

Anthony Jones (Supervisor)
Ph: 8344 8524
Email: a.jones@unimelb.edu.au

David Beckett (Supervisor)
Ph: 8344 8516
Email: d.beckett@unimelb.edu.au
Consent Form for Participants

THE UNIVERSITY OF MELBOURNE
MELBOURNE GRADUATE SCHOOL OF EDUCATION

Consent form for persons participating in research projects
Project Title: “Individual laptop computer program and student engagement”

Name of participant: ___________________________________________
Name of investigator(s): _________________________________________

1. I consent to participate in the project named above, the particulars of which – including details of interviews and questionnaires – have been explained to me. A written copy of the information has been given to me to keep.

2. I authorise the researcher or assistant to use for this purpose the details of interviews and questionnaires referred to under (1) above.

3. I acknowledge that:
   a. The possible effects of the details of interviews and questionnaires have been explained to me to my satisfaction;
   b. I have been informed that I am free to withdraw from the study at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied;
   c. The project is for the purpose of research;
   d. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements;
   e. I understand that my responses will be audio-taped throughout the project;
   f. I have been advised of any perceived risks involved with this project.
   g. I have been informed that I will not be identified in any publication and pseudonyms will be used to replace my name.
   h. I understand that this consent form will be retained by the researcher after it has been returned.

Signature of Parent: ______________________________ Date: ________________

Signature of Child: ______________________________ Date: ________________

Signature of Researcher: __________________________ Date: ________________
APPENDIX 3

Consent Form for Principals

THE UNIVERSITY OF MELBOURNE
MELBOURNE GRADUATE SCHOOL OF EDUCATION

Consent form for persons involved in research projects
Project Title: “Individual laptop computer program and student engagement”

Name of participant: ___________________________________________

Name of investigator(s): _________________________________________

4. I consent to participate in the project named above, the particulars of which – including details of interviews and questionnaires – have been explained to me. A written copy of the information has been given to me to keep.

5. I authorise the researcher or assistant to use for this purpose the details of interviews, questionnaires and observations referred to under (1) above.

6. I acknowledge that:
   a. The possible effects of the details of interviews and questionnaires have been explained to me to my satisfaction;
   b. I have been informed that participants are free to withdraw from the study at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied;
   c. The project is for the purpose of research;
   d. I have been informed that the confidentiality of the information provided for this study will be safeguarded subject to any legal requirements;
   e. I understand that participants’ responses will be audio-taped throughout the project;
   f. I have been advised of any perceived risks involved with this project.
   g. I have been informed that those involved in the study will not be identified in any publication and pseudonyms will be used to replace names of participants.
   h. I understand that this consent form will be retained by the researcher after it has been returned.

Signature of Principal: __________________________________________ Date: _________________

Signature of Leading Teacher Middle Primary: ___________________________ Date: ___________

Signature of Leading Teacher Upper Primary: ___________________________ Date: ___________

Signature of Researcher: __________________________________________ Date: _________________
APPENDIX 4

Student Questionnaire

1. How do you feel about using computers?

2. Do you like using computers?

3. What makes you feel good about using computers?

4. What puts you off using computers?

5. How often do you use your computer?

6. If you were having a problem with a computer program or task, what would you do to find out how to fix the problem?

7. Do you find computers boring?

8. How would you rate your feelings towards computers? (circle a number)

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<td>5 (Very Curious)</td>
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</tbody>
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APPENDIX 5

Questionnaire for Parents

1. Do you have a computer at home?

   If yes, how long have you owned this computer?

2. How much time would your child spend using a computer at home each week?

3. What are the top three activities your child would use the computer for?

4. How would you describe your child’s attitude towards using computers?
Interview Questions

Introductory Questions
1. What is your name?
2. How many people do you have in your family?
3. What is your favourite subject at school?

I’m here to talk to you today about computers.
4. Do you like using computers? Why?
5. What is your favourite thing to do on computers?
6. Do you feel confident using computers?
7. What do you use computers for?

Key Questions:
8. What do you think your strengths are when using computers?
9. What do you think your weaknesses are when using computers?
10. Where did you learn to use a computer?
11. Can both your parents use a computer?
12. Do you think having a computer to use everyday has helped you? Why?
13. If you were having a problem with a computer problem or task, what would you do to find out how to fix the problem?
14. Thinking about computers, what do you wish you knew more about?
15. Think about a person who is really good at using computers in the classroom. Are they male or female? Why do you think they are really good?

Thank you very much for your help.
## APPENDIX 7

### Observational Computer Skills Assessment

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</table>
**APPENDIX 8**

*Perceived Ability Questionnaire*

Could you please let me know if you can complete any of the following tasks? Please circle YES if you think you can do the task or NO if you can not do the task.

Can you:

### Use Microsoft Word to:
- Open, close, save and print a document? YES NO
- Cut, paste and copy text or pictures? YES NO
- Preview your documents before printing? YES NO
- Change the page orientations? YES NO
- Spell check? YES NO

### Use Microsoft Excel to:
- Make a table? YES NO
- Make a graph? YES NO
- Use formulas? YES NO

### Use Microsoft PowerPoint to:
- Change the slide layout? YES NO
- Change the background? YES NO
- Animate one object? YES NO
- Animate multiple objects at once? YES NO
- Add sounds to a presentation? YES NO
- Use a custom animation path? YES NO
- Change the slide transition? YES NO

### Use Email to:
- Reply to an email? YES NO
- Forward an email? YES NO
- Email a picture or document? YES NO

### Use the internet to:
- Search on Google? YES NO
**APPENDIX 9**

**Interview Guide**

An interview guide for the semi structured interviews was carefully devised. It was important that the language used was simple, that questions could not be double barrelled and the researcher was not directing their responses. The questions were also structured to allow time for the participants to settle and adjust to the situation, so they were able to feel comfortable answering the main questions. See Figure 16 below for the interview question structure.

![Figure 16: Interview Question Structure](image)

Information about audio recorder:

Each interview was recorded in a room that was quiet and free from distractions. The interviews were recorded on an Olympus DS-2200 Digital Voice Recorder and stored on a removable 128MB xD-Picture Card which allowed for easy transfer onto the computer. This device was placed close to the interviewee so that all responses could be heard. Each respondent was asked whether they were happy for the interview to be tape recorded and subsequent to that, the tape recorder was turned on.
APPENDIX 10

Transcription Information

When quotations or statements have been taken directly from the data and included in the thesis, reference to the source has been made, for example:

(Aaron S1 IQ11) which indicates that the quotation has been taken directly from Aaron’s responses from Question 11 in the interview during Stage One.

(Jane S2 IQ5) which indicates that the quotation has been taken directly from Jane’s responses from Question Five in the interview during Stage Two.

(Gabby S1 PQ4) which indicates that the quotation has been taken directly from the response on Gabby’s parent questionnaire from Question Four during Stage One.

(Sarah S2 SQ2) which indicates that the quotation has been taken directly from Sarah’s questionnaire responses from Question Two during Stage Two.
## APPENDIX 11

### Stage 1 Data Matrix

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<th>Data Sources</th>
<th>Interviews</th>
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<th>STUDENT FEELINGS/OPINIONS</th>
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<tr>
<td><strong>Time Usage</strong></td>
<td>1 comment</td>
<td></td>
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<tr>
<td><strong>Common Use</strong></td>
<td>1. Creative, Games, music, researching, 3. email</td>
<td>1. Games, 2. research, animation, creative, homework</td>
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<tr>
<td><strong>Confidence</strong></td>
<td>Yes – 3 Middle - 6</td>
<td>Yes – 5 Middle - 1</td>
<td>Yes – 5 No – 1 Middle -2</td>
<td>Likert Rate 1: 0 2: 0 3: 6 4: 2 5: 1</td>
<td>Likert Rate 1: 0 2: 0 3: 1 4: 4 5: 3</td>
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<tr>
<td><strong>Ability</strong></td>
<td>- drawing, opening, - word, internet, research, - typing, - research, - word, emails, - helping others, viruses</td>
<td>See graph</td>
<td>See graph</td>
<td>See graph</td>
<td>See graph</td>
</tr>
<tr>
<td><strong>Sibling Influence</strong></td>
<td>Brother – 3</td>
<td>Brother – 2</td>
<td>Sister – 2</td>
<td>Brother – 2</td>
<td>Brother – 3</td>
</tr>
<tr>
<td><strong>Parent Support</strong></td>
<td>9 comments - Dad 5 Mum 3 Both 1</td>
<td>6 comments - Dad 1 Mum 3 Both 1</td>
<td></td>
<td>Dad – 1 Mum – 1 Both parents - 1</td>
<td>Dad – 2</td>
</tr>
<tr>
<td><strong>Teacher Support</strong></td>
<td></td>
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<td>Teacher – 3</td>
<td>Teacher – 3</td>
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<td><strong>Role Models</strong></td>
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<tr>
<td><strong>Aspirations towards friends</strong></td>
<td>Greg Z – 2 boy - 1 Toby – 1 Liz – 1 Greg – 2 Steph – 1 Josh – 1 Chms – 1 Many - 1</td>
<td>Greg -3 Chris – 2</td>
<td>Jay – 1 Josh – 1</td>
<td></td>
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</tr>
</tbody>
</table>

### DATA SOURCES
- Interviews Teacher Observation
- Observation
- Children's Checklist
- Student's Questionnaire
- Parent Survey

### Likert Scale
- Likert Rate 1: 0
- Likert Rate 2: 0
- Likert Rate 3: 6
- Likert Rate 4: 2
- Likert Rate 5: 1

### Time Usage
- Ave use = 3 ½ days per week
- Ave use = 2 ½ days per week
- Ave hours = 2 hrs & 30 mins/w
- Ave hours = 4 hrs & 6 mins/w

### Confidence
- Yes – 3 Middle - 6
- Yes – 5 Middle - 1
- Yes – 5 No – 1 Middle -2
- Yes – 4

### Ability
- See graph
- See graph
- See graph
- See graph

### Sibling Influence
- Brother – 3
- Brother – 2
- Sister – 2

### Parent Support
- 9 comments - Dad 5 Mum 3 Both 1
- 6 comments - Dad 1 Mum 3 Both 1
- Dad – 1 Mum – 1 Both parents - 1

### Teacher Support
- Teacher – 3

### Aspirations towards friends
- Greg Z – 2 boy – 1
- Toby – 1 Liz – 1
- Steph – 1 Josh – 1 Chms – 1 Many - 1
- Greg -3
- Chris – 2
- Jay – 1

---

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## Stage 2 Data Matrix

<table>
<thead>
<tr>
<th>DATA SOURCES</th>
<th>Interviews</th>
<th>Teacher Observation</th>
<th>Children's Checklist</th>
<th>Student's Questionnaire</th>
<th>Parent Survey</th>
</tr>
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<tbody>
<tr>
<td><strong>NEW TECHNOLOGY</strong></td>
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<tr>
<td>Laptops</td>
<td>Girls - do lots - access - ability increase - interesting - new knowledge - increase use - increase knowledge - increase confidence</td>
<td>Boys - increase knowledge - increase self esteem - happier - access - ability increase - new knowledge</td>
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<td>Language</td>
<td>Lara (unsure) Maryanne (understand basic) Gabby, Bianca (very competent)</td>
<td>Andy (unsure) Wallace (very competent)</td>
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<td><strong>TOPICS</strong></td>
<td>Girls Boys Girls Boys Girls Boys Girls Boys</td>
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**APPENDIX 12**
<table>
<thead>
<tr>
<th>STUDENT FEELINGS/OPTIONS</th>
<th>Interviews</th>
<th>Teacher Observation</th>
<th>Children's Checklist</th>
<th>Student's Questionnaire</th>
<th>Parent Survey</th>
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</thead>
<tbody>
<tr>
<td><strong>Enjoyment/Interest</strong></td>
<td>Positive: 8 Negative: 1</td>
<td>Positive: 5 Negative: 0</td>
<td>Positive: 0 Negative: 1</td>
<td>Likert Rate 1: 2: 3: 4: 5: 6: 7: 8: 9: 10</td>
<td>Positive: 7 Negative: 0</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>1 comment</td>
<td></td>
<td></td>
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<tr>
<td><strong>Common Use</strong></td>
<td>1. Creative 2. Games, music, researching, 3. email</td>
<td>1. Games 2. research, animation, creative, homework</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Confident</strong></td>
<td>Yes – 3 Middle – 6</td>
<td>Yes – 5 Middle – 1</td>
<td>Yes – 5 No – 1 Middle – 2</td>
<td>Yes – 4 Likert Rate 1: 0 2: 3: 4: 5: 6</td>
<td>Yes – 4</td>
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<td><strong>Ability</strong></td>
<td>saving, opening, learning, internet, research, writing, drawing</td>
<td>typing, research, word, emails, helping others, vases</td>
<td>See graph</td>
<td>See graph</td>
<td>Fun Information source Internet Know lots Creative, paint, drawing New learning Games Information source Animation</td>
</tr>
<tr>
<td><strong>Sibling Influence</strong></td>
<td>Brother – 3</td>
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<td>Sister – 2</td>
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<td><strong>Teacher Support</strong></td>
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<td><strong>External Factors</strong></td>
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<td><strong>Role Models</strong></td>
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### Data Sources

- Interviews
- Teacher Observation
- Children’s Checklist
- Student’s Questionnaire
- Parent Survey

### Topics

- Interviews
- Teacher Observation
- Children’s Checklist
- Student’s Questionnaire
- Parent Survey

### Student’s Feelings/Opinions

- **Ability**
  - saving, opening, learning, internet, research, writing, drawing
  - typing, research, word, emails, helping others, vases
- **Confident**
  - Yes – 3 Middle – 6
  - Yes – 5 Middle – 1
  - Yes – 5 No – 1 Middle – 2
- **Time**
  - 1 comment
- **Common Use**
  - 1. Creative
  - 2. Games, music, researching, 3. email
  - 1. Games
  - 2. research, animation, creative, homework
- **Confident**
  - Yes – 3 Middle – 6
  - Yes – 5 Middle – 1
  - Yes – 5 No – 1 Middle – 2
- **Time**
  - 1 comment
- **Common Use**
  - 1. Creative
  - 2. Games, music, researching, 3. email
  - 1. Games
  - 2. research, animation, creative, homework

### External Factors

- Role Models
  - Greg Z – 2
  - Izzy – 1
  - Toby – 1
  - Liz – 1
  - Greg – 2
  - Steph – 1
  - Josh – 1
  - Chris – 1
  - Marty – 1
- Girls
- Boys

### Enjoyment/Interest

- Positive: 8 Negative: 1
- Positive: 5 Negative: 0
- Positive: 0 Negative: 1
- Likert Rate 1: 2: 3: 4: 5: 6: 7: 8: 9: 10
- Positive: 7 Negative: 0
APPENDIX 13

Data Collection Analysis Guide

Interview Questions

Older Siblings
IQ2. Siblings
IQ13. Technical Assistance

Enjoyment
IQ4. Enjoyment

Usage
IQ5. Free time
IQ7. Main Usage
IQ14. Time Spent

Confidence
IQ6. Confidence
IQ14. New Knowledge

Ability
IQ8. Strengths
IQ9. Weaknesses
IQ15. Assessing others ability

Role Models
IQ11. Parents

Laptop Program
IQ12. Computer everyday helps?

Technical Issues
IQ13. Fixing problems

Student Questionnaire Analysis

Enjoyment
SQ2. Enjoyment

Interest
SQ3. Positive
SQ4. Negative
SQ7. Boring?

Usage
SQ5. Time spent

Technical Issues
SQ6. Technical Problem

Parent Questionnaire

Usage
PQ2. Time Spent
PQ3. Common Usage

Enjoyment/Interest/Confidence
PQ4. Attitudes
Stage One Interview Transcript

Introductory Questions:

1. What is your name? Aaron

2. How many people do you have in your family? Five
   Who is that? My mum, my dad, my brother and my sister.
   How old is your sister? Suzy is 13.
   How old is your brother? He’s 14.

3. What is your favourite subject at school? I don’t really have a favourite subject.
   What do you like doing? Practically everything

I’m here to talk to you today about computers.

4. Do you like using computers? Yeah
   Why? Because they are really fun to find things out and explore new things and just the technology is really good and things.
   When you say the technology is really good, what do you mean by that? Like if you use word, it does a word count for you sometimes if you want it to and it can do things that an old fashioned computer couldn’t do.

5. What is your favourite thing to do on computers? Um probably play games or write a story on word.
   Do you know what sort of games you would play? Um, no, not really.
   Are they on a disc or are they on the internet? Sometimes I would play games on my USB or maybe I might play games on the internet.

6. Do you feel confident using computers? I feel pretty confident not like completely confident but yeah.
   Why would you say pretty confident? Because sometimes I don’t really know about some of the viruses and about some of the how to use things and it might end up in trouble or something.

7. What do you use computers for at home? Well, if I would use it I would probably just write stories on word.
   What about at school? Um, mainly maths games, cause they’re quite fun.

Key Questions:

8. What do you think your strengths are when using computers? Um, I’m definitely really good at word. I’m pretty good at sending emails and I’m quite good at Google and looking up things and that’s about it.
9. What do you think your weaknesses are when using computers? I can’t send an email from, I can’t forward an email or I can send an email, like reply an email.

Anything else? Not really.

10. Where did you learn to use a computer? Well, my brother sort of taught me and then I sort of my friends said go on this website and stuff. Yeah.

And not your sister? Yeah my sister as well, to help me get started.

Anyone else at home? My mum knows nothing about computers, well she probably does but she doesn’t really know anything about technology. My dad is way too busy.

11. Can both your parents use a computer? Yeah they can. My mum can do emails but that’s about it. My dad he goes on computers 24-7. He’s really good.

12. Do you think having a computer to use everyday has helped you? Yes

Why? Because every, I don’t normally use the computer at home every day but for homework and things they might do things that I don’t know about and I might find out new things and then I might come across something in computers.

13. If you were having a problem with a computer problem or task, what would you do to find out how to fix the problem? I would um ask maybe my friends or a teacher or I would maybe ask, or maybe just improvise and see what happens. Yeah and if I’m home, I would ask my brother…, or my sister.

Who would you go to first at home? Probably my brother because he is home first – he’s oldest he probably knows more. And then my sister.

14. Thinking about computers, what do you wish you knew more about? Just how to um how to forward emails and how to reply emails. I know how to type emails, but I don’t know how to send them or get the address or anything. I know how to clip something on to it.

15. Think about a person who is really good at using computers in the classroom. Probably Jay or maybe Josh

Why do you think they are really good? Because if I ever ask them in the classroom they always know what to do, they always…oh I have another person, Greg is really good on computers.

Do you think he is better than Jay or Josh? I think they are all the same.

What sorts of things can they do? If I want to get on a, um, system or something and I don’t know how to, I would probably ask them and they might do it for me.

You have boys and girls in your classroom but you have only mentioned boys. Is there any reason for that do you think? Well if I um ask any of the girls normally, they don’t really know because I don’t think girls really go on the computer. It might be a bit judging a book by its cover but I think most of the girls in my class have no idea how to do it.

And you said they don’t go on computers, is there any reason for that do you think? Well I think maybe they spend too much time doing up their makeup.

What about girls in this class? Girls in this class probably have too much time doing homework, not that they are dumb or anything but or they might do free time making bracelets or something.

Thank you very much for your help.
Author/s:
Morris, Laura Elizabeth

Title:
Learning with laptops: the impact of the ILP on gendered primary classrooms

Date:
2010

Citation:

Persistent Link:
http://hdl.handle.net/11343/35585

File Description:
Learning with laptops: the impact of the ILP on gendered primary classrooms

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